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ECONOMIC GEOGRAPHY



JULY

DAIRYING INDUSTRY OF NEW ZEALAND

Horace Belshaw, *Auckland University College, New Zealand*

AGRICULTURAL PRODUCTION IN CHINA

Albert La Fleur and Edwin J. Foscue, *Economic Geographers, Clark University*

AGRICULTURAL REGIONS OF NORTH AMERICA

Oliver E. Baker, *Agricultural Economist, U. S. Department of Agriculture*

AGRICULTURAL CONDITIONS IN FLORIDA IN 1925

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BOLIVIA AS A SOURCE OF TIN

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THE TRADE OF URUGUAY

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THE PHILIPPINE COCONUT INDUSTRY

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THE INDUSTRIAL GEOGRAPHER

THE growing influence of industry upon the lives of men, and the control of man's activities through industrial processes, the moulding of his thoughts in manifold forms of industry, and the shaping of his future by the effects of present modern industry, have introduced into geography a set of powerful factors that may not be ignored or neglected. The century just past has recorded a rapid growth and spread of industrialism, which, rapid as they have been, are but an earnest of the progress this century bids fair to write upon its record.

That man is finding it hard to adjust himself to these modern industrial conditions is increasingly evident. He can not wait for time through slow evolution to solve his problems; industry is moving too fast to permit him this course. He must take most of his present, and much of his future, into his own hands, and try to hold them firm while industry works upon them, and not leave to environment the future of the race. He must know how much of the land, its relief, its climate, its resources are his to bend to his own needs. He must survey the whole field of his environment, his resources, his associate peoples.

The increasing number of geographic and economic surveys reveals his alertness to the problems he must solve. In the field of such surveys the industrial geographer, with his scientific attitude, his training, his technique, is peculiarly efficient. His breadth of view, his direction of approach, and his sureness of method make him invaluable. In municipal government particularly, in many great manufacturing and distributing enterprises, and in industrial crises brought on by war, or panic, or flood, or fire, the industrial geographer has already proved his worth.

A social, economic, or political survey that ignores the influence of geographic factors—location, relief, seasons, climate and weather, for instance—must be somewhat superficial; with the help of an industrial geographer to define the bases upon which all human activities, including industry, rest, the foundation should be substantially laid.

ECONOMIC GEOGRAPHY

VOL. 3

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DAIRYING INDUSTRY OF NEW ZEALAND¹

Dr. Horace Belshaw

Auckland University College, New Zealand

NEW ZEALAND dairying provides an excellent example of the interrelation of geographic and economic forces in determining the localization, development, and organization of an industry. For this reason it is interesting, quite apart from its being the largest single source of dairy exports in the world, and the second most important industry in New Zealand. The main purpose of this article is to describe the present organization of the industry; but some account of its history and of the geographical conditions which have affected its growth is useful both of itself and by way of introduction.

HISTORICAL SKETCH; ECONOMIC INFLUENCE ON DEVELOPMENT

The phenomenally rapid development of New Zealand dairying may be summarized in the following table:

The history of the industry may be conveniently divided into three periods: before 1882, the period of stagnation and depression; 1882-1895, the period of establishment; 1895-1921, the period of rapid growth. The year 1921 probably dates the beginning of a new period heralded by severe depression, but marked in its present and future stages by steady growth and the closer integration of the industry under the State control of marketing.

New Zealand's first missionary, the Reverend Samuel Marsden, was also her first farmer. Marsden also initiated the dairying industry by the import of short-horn cattle. He bought 200 acres of good land for twelve axes and in 1830, established a farm at Keri-keri, in the Bay of Islands. Darwin visited this in 1835 and was much impressed by the range of crops and fruit.

EXPORTS OF BUTTER AND CHEESE FROM NEW ZEALAND, 1875-1924, TOGETHER WITH NUMBER OF DAIRY COWS, 1895-1924

Year	Exports				Number of Dairy Cows (000 omitted)
	Butter (000 omitted) Quantity Cwt.	Value £	Cheese (000 omitted) Quantity Cwt.	Value £	
1875.....	(104)*	(660)*	(442)*	(1,862)*	
1880.....	(2,717)*	(8,350)*	(717)*	(1,983)*	
1885.....	25	102	15	36	
1895.....	58	228	77	151	257
1905.....	306	1,409	89	205	498
1915.....	420	2,701	817	2,730	750†
1924.....	1,269	11,642	1,594	7,023	1,323

(After New Zealand Official Yearbook, 1926, p. 875, 878.)

* Figures in brackets represent actual quantities or values.

The annual local consumption of dairy products is approximately as follows: Milk, 85,000,000 quarts; Butter, 22,000,000 lbs.; Cheese, 5,000,000 lbs.

† Figure for 1916.

¹ This article is concerned chiefly with butter and cheese production, though other products such as dried milk are increasing in importance.

By 1840 a small but definite trade in dairy produce was established; but until the first use of refrigerative methods in 1882, the market was almost entirely local. In the early years, trade was carried on by barter with the small coastal townships, or to replenish the larder of visiting vessels. Demand was fairly constant, but prices fluctuated violently, owing to fluctuations in conditions of supply. Cheese soon achieved a reputation on the English market; but it was variable in quality and deteriorated in transport. Butter could not be exported farther than Australia. Even then it was heavily salted and in kegs, and "was liable to develop all manner of obnoxious flavours in the short voyage across the Tasman sea."

and in the boom of 1870-1876. When this boom collapsed, many settlers failed. The burden of depression ultimately recoiled on the Banks, and the chief of these, the Bank of New Zealand, had to appeal to the Government for assistance.

Throughout the greater part of the first period, almost the whole of the dairy produce was manufactured on the farm, and a commodity of poor and varying quality was the result. Some time during the decade 1860-1869 a dairy factory was established, some say by a Chinaman named Chong; if not, by a Swiss named by Pffeniger—but certainly by a foreigner. By 1880 there were still only five factories in operation.

The characteristics of the first period



FIGURE 1.—A mixed dairy herd on a farm in Taranaki under the shadow of beautiful Mt. Egmont. Taranaki is the dairyman's paradise.

The industry, thus hindered in expansion by remoteness from adequate markets and by difficulties of transport, suffered severely from the depression of the seventies and eighties, which, though general, was intensified in New Zealand by the excessive borrowing policy instituted by Sir Julius Vogel in 1870. This policy was designed to procure capital for the opening up of the rich resources of the young country. Loans were expended in encouraging immigration and opening up the land. While development was necessary, it was also premature and frequently misdirected. It resulted in reckless speculation in land,

are then: first, a small, domestic market, limited by the perishability of the product and inefficient transport; second, and dependent on this, highly fluctuating prices; third, a commodity poor and variable in quality, and manufactured mainly on farm dairies. To these might be added a period of falling world prices commencing about 1873, accentuated in New Zealand by excessive borrowing and land inflation followed by collapse and depression.

In the year 1882, in the midst of depression, the first shipment of frozen meat (with some dairy produce) from New Zealand was landed in London and

the way was pointed to future prosperity. The effects were immediate and lasting. Exports of butter and cheese jumped from £15,000 value in 1881 to £62,000 in 1882, the first year of refrigeration. Export quantities and values have continued to increase steadily and rapidly ever since, though, of course, there have been occasional temporary setbacks. During the whole of the period, 1873-1895, the industry was faced with a period of falling world prices; but in spite of this handicap the stimulus of improved transport was sufficient to enable it to make appreciable headway. Nevertheless, had manufacture still been conducted in the old haphazard way on the farm, the curve of exports would have risen very much more slowly. The development of the factory system made it possible to place a commodity of high and uniform quality on the English market, and by creating confidence as to quality among buyers greatly facilitated trade.

The small number of factories before 1880 is explained by the fact that until then the factory possessed few advantages over the farm dairy, while the market was too small and uncertain to warrant any considerable capital expenditure in plant; but in 1879, the principle of centrifugal force was used in separating cream through the invention of the cream separator. In 1890 Babcock invented his machine for testing butter fat content. Within thirty years of its inception into New Zealand all the essentials of the modern factory system had been developed. As a consequence, the number of factories increased rapidly. The development of a system of payment according to butter fat content, which was made possible by the Babcock tester, enabled the pooling of milk at the factory, and so has helped to make coöperation with its economies in manufacture and marketing the dominant system. Without the tester, it is safe to assert that coöperation would have made but a languishing growth. Similarly the integration of local societies into larger units, the utilization of by-products, the develop-



FIGURE 2.—A location and rough relief map of New Zealand.

ment of an efficient system of State Grading, and indeed, the majority of the external and internal economies which the industry now possesses may be attributed directly, in greater or less degree, to the development of a factory system of manufacture.

The year 1895 ushered in a period of rising world prices, which was of the utmost importance in stimulating, not only dairying, but also the majority of primary industries in New Zealand. It is unfortunate that economic geographers generally do not stress sufficiently the importance of such apparently extraneous conditions as *general* price movements in influencing the development of regions or industries. The relevance of such a study in respect of both New Zealand dairying and New Zealand as a whole is apparent enough.

New Zealand is a debtor country, and has incurred the greater part of her indebtedness abroad. Similarly her agricultural industries are debtor industries, for there are few farms which are not appreciably mortgaged. Since

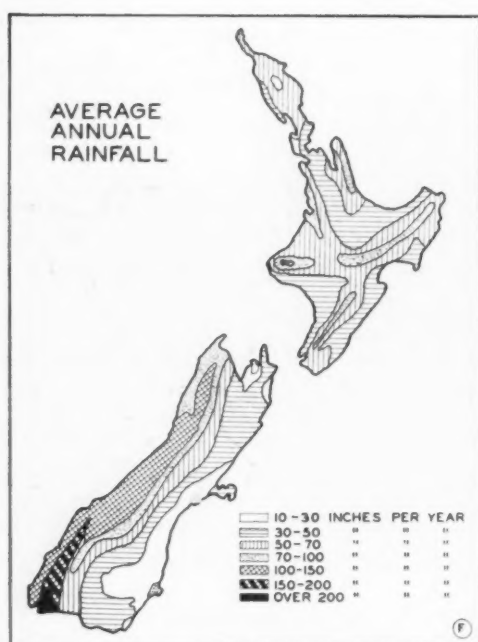


FIGURE 3.—The distribution of the average annual rainfall of New Zealand gives one good clue to the distribution of the dairy industry. Adequate rainfall for good pasturage and not too heavy for open field grazing tend to delimit the industry. (After Marshall, *Geography of New Zealand*.)

the annual payment in the shape of interest on public debts or on farm mortgages is measured in terms of money, and not of purchasing power, it follows that during rising prices, a diminishing amount of real purchasing power is paid over to creditors in liquidation of a fixed amount of money indebtedness. The dairy farmer who is also a debtor therefore finds his burden doubly lightened as prices rise, for he finds it necessary to sell fewer pounds of butter-fat in order to pay such taxes as represent interest on outstanding public debts, and to meet his fixed mortgage charges. In fact, his costs generally will tend to rise less than his selling prices, so that a period of rising prices is almost invariably one of rising profits. The rising level of prices during the years 1895-1921 certainly affected the New Zealand dairyman in this way, and was responsible in no small measure for the rapid development of the industry.

Naturally, also, the trend of the export trade from other countries to the United Kingdom, New Zealand's chief market, has been of considerable importance. Although there have been important annual variations in the import trade of butter and cheese into the United Kingdom, the trend as shown by the quinquennial moving average is fairly stable from the beginning of the present century up to the outbreak of war. From then on until 1920, imports of cheese rose somewhat, while imports of butter fell appreciably. On the other hand, partly as the result of improving quality which aided New Zealand products in displacing their rivals, partly owing to the diverting of supplies elsewhere, New Zealand has obtained an increasing share of the total trade to the United Kingdom. Imports of butter and cheese from *foreign* sources show marked annual fluctuations, particularly in the case of the former, but the general trend is downwards. As regards imports from the Dominions, Australian supplies of butter fluctuate enormously, while the export surplus of Canada falls considerably in the case of both butter and cheese. Indeed, the decline in Canadian exports to the United Kingdom has provided exceptionally favourable conditions for the compensatory expansion of New Zealand exports, particularly in the case of cheese. Space does not permit of a detailed analysis of the causes of these movements; but the accompanying diagrams provide an effective summary, and are reproduced without comment.

The above influences have been supported within the country itself by conditions distinctly favourable to the development of small-holdings; notably easy credit, a shortage of hired labour and the policy of the State towards agriculture, both positively in the shape of Advances to Settlers, the provision of research, educational and inspectional facilities; and negatively through progressive land taxation designed to break up the large estates. Some of these are discussed



FIGURE 4.—A shorthorn milking herd at Ruakura State Farm, near Hamilton, Waikato.

later; but although they have been important, their influence can easily be overrated, especially in the case of State policy in settlement and farm finance, which at best has done little more than smooth the path of general economic progress.

GEOGRAPHICAL CONDITIONS

The foregoing paragraphs have indicated in outline, the more important economic forces encouraging the development of the industry. It is apparent,

however, that an industry separated by some 12,000 miles of sea from its market could not have risen to its present position of prominence were it not conducted under conditions of soil and climate which permitted of low cost, except at the expense of the standard of living of producers.

The best conditions for dairying are those which favour an abundance of cheap pasture, associated with a warm, moist climate, with mild winters and suitable soil, though it may be conducted



FIGURE 5.—A herd of fine Jerseys in Auckland in environs quite foreign to their native heath. (Courtesy of Publicity Office, Government of New Zealand.)

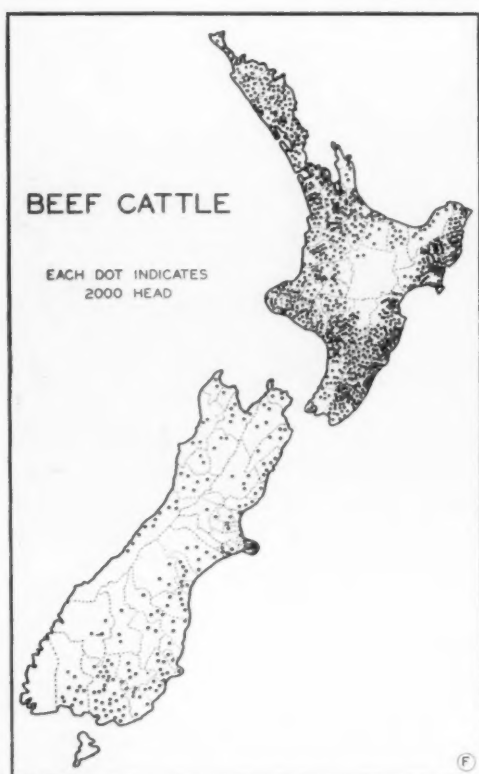


FIGURE 6.—The distribution of beef cattle in New Zealand.

successfully under arable conditions or as a branch of mixed farming in regions of low rainfall or severe winters, or on small farms where pasture would not pay. In Canterbury province, for example, dairying is carried on in conjunction with cereal growing. One need only refer to Denmark as a country of small farms in which dairying is successfully conducted under arable conditions. But the best conditions for dairying in New Zealand, if not in the world, are to be found in the specialized dairying provinces of Taranaki, Auckland, Wellington, or Southland. These regions enjoy a rainfall of from forty to fifty inches, a mild climate, and more especially, mild winters, which give them a considerable advantage over their competitors in Australia, where rainfall is uncertain, or Western Europe where winters are comparatively severe. Severe conditions of climate in winter necessitate

the housing of stock with an attendant increase in labour costs and in the amount of supplementary feed, which it is necessary to grow or purchase. Where land, and not labour, is the limiting factor, as in Europe—that is where the supply of labour is plentiful and cheap—the extra attention to stock involved in housing and stall feeding may not be of very considerable importance; but in New Zealand where hired labour is scarce and wages high, the extensive development of the industry would have been impossible under such conditions as exist in Europe. Remote as she is, New Zealand is able to compete effectively in the world markets only because mild conditions of climate remove the necessity for paying any considerable attention to cattle, even in midwinter.

With its adequate rainfall, New Zealand's position in the center of a great ocean (over one thousand miles from the

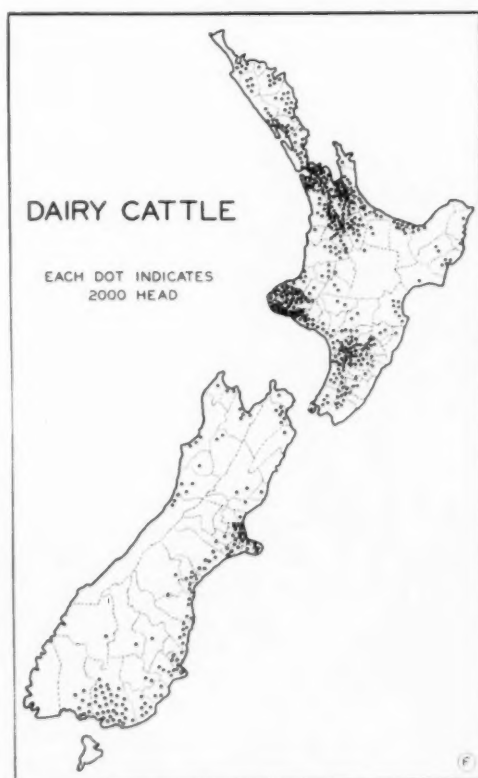


FIGURE 7.—The distribution of dairy cattle in New Zealand.



FIGURE 8.—Hawera, a typical dairy center in the heart of the closely-settled Taranaki pastoral region, under the very shadow of Mt. Egmont. (Courtesy of Publicity Office, Government of New Zealand.)

nearest extensive land surface) gives it a mild climate with relatively small seasonal changes in temperature. Even in midwinter, pasture makes some growth, and a canvas cover affords adequate protection to stock against all but occasional storms. Except in rare cases, all the animal foods used are grown on the farm. New Zealand is, in fact, a veritable paradise for the pastoralist. About three-quarters of the occupied land is used for pastoral purposes. Of this, one-half (over 16 million acres) consists of sown grasses and the rest of native tussock country admirably suited to sheep and cattle raising, but less suited to dairying with its dependence on more intensive methods. The area under sown grasses is greater than in Australia and Tasmania combined and the productivity of its grass lands is estimated to be about nine times greater. Under conditions such as these with pasture the main crop, cost of production is low, in spite of high land values and high wages, though natural advantages are strengthened by the farming methods adopted.²

² The cost of producing butter-fat is calculated to be about two-thirds that in Wisconsin, though land values are half as high again in New Zealand, and yield per cow is greater in Wisconsin. See *Intensive Dairying in New Zealand and Wisconsin*, Bull. No. 377, Wisconsin Experimental Station, p. 22, which is a very useful comparison of the industry in the two places.

DISTRIBUTION OF THE INDUSTRY

Lack of space prevents a detailed examination of the forces which have determined the localization of the industry in New Zealand itself. It is sufficient to refer the reader to Figures 2, 3, 4, and 5, from which it is apparent that rainfall and the topography of the country have been the dominant factors. It will be noted from an examination of Figures 2, 3, and 4 that the industry is concentrated mainly in regions which enjoy a rainfall of from thirty to seventy inches, but in some provinces, notably Canterbury and parts of Otago, dairying is a useful adjunct of mixed farming under less favourable conditions of rainfall. Some districts, such as Westland, though suited climatically to milk production have been delayed in development as dairying centers owing to difficulties of transport. Commercial dairying can scarcely succeed except where milk or cream may be carried readily to the factory; and butter, cheese, and dried or condensed milk may be transported cheaply to the cities and ports. The dairying districts are usually well roaded and easily accessible by rail or motor wagon to the assembling points. Sheep or cattle have generally preceded the dairy cow into the "back-block" settlements to be displaced as transport has improved. Improvement



FIGURE 9.—Typical broken country in the pioneer belt of Taranaki where conditions permit cultivation of crops to supplement the dairy industry.

of roads and the bridging of rivers will prove important factors making for the future expansion of the industry, though its future development will probably take place to a greater degree through the displacement of sheep or cereal production in the more fully developed areas.

Reference to Figure 2 will show the importance of topographical factors in determining the distribution of the industry. A considerable area in both islands is covered by mountain ranges.

This applies especially to the South Island, in which the Southern Alps form a magnificent backbone covered with perpetual snows, while numerous ranges scarcely less imposing radiate from it. In the North Island in which the greater part of the industry is located, mountain ranges are less majestic and cover a much smaller proportion of the total area; but they still account for about one-tenth of the total surface, while a considerable volcanic plateau (to which active peaks,



FIGURE 10.—The homestead of a pioneer New Zealand dairyman. (Courtesy of Emigration Department, New Zealand Government.)



FIGURE 11.—Part of a standard Ayrshire herd at the Mournahaki State Farm, Taranaki.

hot springs, geysers, and extensive lakes add charm and variety), barren for the great part, covers the heart of the island. In contrast with Switzerland or the Tyrol, dairying has made little use of mountain pastures, but is spread out on the plains, or along the fertile valleys, over the low downs, or occasionally among the low hills. The lower levels of the ranges are covered with semi-tropical

Frequently, as in the Manawatu, Westland, Southland, and parts of Auckland provinces, dairying land is heavy, swampy in character; but Taranaki, which might almost be called the cheese farm of the Empire, is a land of rolling downs of light volcanic soil rising, on the one hand, to the beautiful extinct cone of Mount Egmont, on the other, to the rough hill country of the hinterland.



FIGURE 12.—Jersey calves on an Auckland farm. (Courtesy of Publicity Office, Government of New Zealand.)

forests on the West—relics of a hotter climate in the past—except where these have been devastated by fire or the bushman's axe, but on the East they give place to tussock land which makes excellent pasture for sheep. The upper heights are, of course, barren and useless save for the tourist or the mountaineer.

ORGANIZATION OF THE INDUSTRY

The New Zealand dairy industry is highly organized. From the farm to the ultimate market, the production, manufacture, and distribution of the product is arranged to take advantage of every favourable physical and economic opportunity. The management of the



FIGURE 13.—A typical dairy factory in Taranaki, the pastoral realm of New Zealand.

farms, the efficiency of the factory, the ability of the labour, transportation and marketing, are well arranged, supervised, or controlled.

FARM ORGANIZATION

Dairying in New Zealand is essentially an industry of small- or medium-sized farms; but the small-holding in New Zealand is very different from the typical small-holding in such countries as Denmark. In that country, it is the return per unit of area which is of prime importance. In New Zealand where land is as yet by no means the limiting factor, the return per unit of labour is the chief influence affecting farm organization.

SIZE OF FARMS

Dairy farms are seldom below 30 acres in area, and seldom above 200 acres. The arithmetical average of nine representative dairy farms investigated by the writer in 1920, was 113 acres and the median 71 acres. In a typical specialized dairying county, the Waimate West County of Taranaki Province, the average farm is of 116 acres; but the most common size throughout New Zealand is probably between 70 and 80 acres.³

SUPPLY OF LABOR

Mere size in terms of acreage tells us very little. The point of importance is that farms tend to approximate to such a size that they can be managed by the farmer and his family without the use of permanent hired labour. The typical

³ The average size given by H. L. Russell and T. Macklin, *ibid.*, p. 22, is 162 acres, but this is almost certainly too high for the *most common* size of farm.

dairy farm in New Zealand is the "family farm." In this, New Zealand is conforming to tendencies of almost universal importance. The point is illustrated in the case of the nine farms referred to—which, we stress, are very representative—on which over 93 per cent of the *amount* of labour was supplied by the farmer and his family, 5 per cent by permanent hired labour, and the rest by casual hands.

About 21 per cent of the *number* of farm workers in New Zealand as a whole are hired, and since many of these labourers are casual, and are employed in part in other occupations, while some members of a typical dairying family will not be enumerated, the percentage of total *work* which is done by hired labour is very much less than 21 per cent, on the whole, and probably does not reach 10 per cent.

The scarcity of hired labour is, in fact, an important cause limiting the size of farm, and so encouraging dairying. Dairy cattle require constant and unremitting attention, so that the herds are



FIGURE 14.—Pasteurizing plant at Riversdale Dairy, butter and cheese factory, Taranaki.

limited to such a size that they can be managed at a pinch by the farmer and his family; for it is no uncommon thing for the hired man to be temporarily absent, or to leave for good at short notice. The chief causes of this scarcity of hired labour appear to be:

1. New Zealand is still a young country so that labour to develop her wide resources is not abundant, especially as most immigrants drift into the cities.

2. Increased facilities for education have reduced the supply of child labour, while the education itself is of such a nature as to encourage the urban drift.

3. Hours of work are long and tedious, wages in industrial and commercial occu-

Kingdom is seldom trained in the arts of Dominion husbandry.

METHODS OF FARMING

The shortage of hired labour has forced the dairyman to fully exploit the magnificent grass lands, especially as grass requires the least labour and is the cheapest crop to grow. On the nine farms mentioned, the distribution of crops in terms of acreage was as follows:

	Per cent
Pasture lands.....	77.0
Root crops.....	5.8
Forage crops.....	2.3
Hay or ensilage.....	7.2
Unploughable land (but including some pasture).....	7.7
	<hr/> 100



FIGURE 15.—Modern equipment in a Taranaki butter factory.

pations are high, entry into the professions is not difficult, and the attractions of town life, as in other countries, are potent. Labour in New Zealand is very independent and extremely mobile, and the hired man seldom stays for long.

4. Until recently, at any rate, it has been comparatively easy for the farm hand to acquire land, so that the status of the hired labourer is usually regarded as a temporary rung in the ladder of ownership.

5. Dairying demands a high degree of intelligence, and some training in the care of cattle, so that the standard of ability required in itself imposes an immediate limitation on the available labour supply. The immigrant from the United

If we take into consideration the area under hay, and unploughable land under pasture, anything from 85 per cent to 95 per cent of the typical dairy farm is under grass. On such farms, a cow can be kept on from one to two acres with no expenditure on supplementary feeds and with a small expenditure of labour on the care of cattle. As a natural result, dairying is highly specialized. Cereal crops are seldom sown on the representative dairy farm, especially in the North Island, and the only stock commonly kept besides dairy cattle are pigs, horses to do the farm work, and occasionally a sheep or two to provide fresh meat. Few pedigree cattle are reared by the

dairyman, and pedigree stock breeding becomes a specialized trade.

In order to conserve pasture as much as possible, a policy of subdivision into small fields is adopted. Out of a total of 106 fields on the nine farms mentioned, 59 were less than five acres in area and only 24 were greater than ten acres in area. Cattle are frequently changed as a field becomes cropped, while fields are rejuvenated by topdressing (chiefly with phosphatic manures) and the distribution of droppings by means of harrowing, which process also partly teases up the soil surface. Next to the system of tethering as it is practiced in Denmark, this use of small fields appears to be the most economical method of pasture feeding.

Labour is also economized by the widespread use of milking machinery, driven by a gasoline engine or occasionally by electricity. By means of a "releaser," the milk is delivered directly into the tank of the cream separator. Other labour-saving devices are steadily gaining ground; but the milking machine is the most important appliance so far adopted, and is in such general use as to be commented on with some appreciation even by experts from the United States, which is above all countries the land of the machine.⁴

FARM CREDIT

⁵ There is no system of coöperative credit in New Zealand, though there are prospects of such a system's being established very soon;⁶ but the New Zealand farmer cannot complain that credit has not been adequate or cheap.

In most districts the bulk of the credit required by rural industries is provided by

⁴ *Op. cit.*, pp. 15-17.

⁵ New Zealand methods of providing rural credit are described in greater detail in *A Brief Survey of Rural Credit* by J. B. Condliffe and H. Belshaw, *New Zealand Journal of Science and Technology*, 1925, pp. 334-352.

⁶ A Royal Commission was recently appointed to tour the world and report on foreign credit systems, and some new credit legislation is likely. So far I have not received information as to what form this will take.

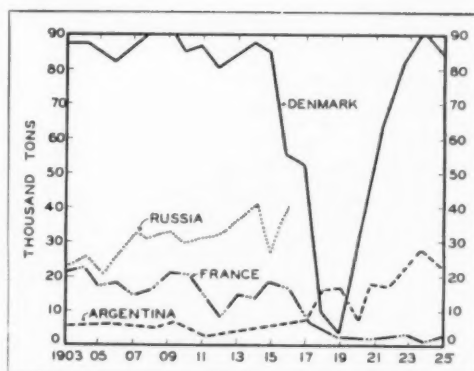


FIGURE 16.—Imports of butter into the United Kingdom from Denmark, Russia, France, and Argentina, 1903-1925.

commercial houses called "agency companies" or "stock and station agents." The main business of these firms is to buy the farmers' crops or sell them on commission, and to deal in farm and household requisites. The provision of short-term credit against personal or chattel security and of long-term credit against mortgages has naturally developed out of the main business. Although such firms have many undesirable features, they have done much to encourage agricultural development and have tended to encourage the small man with little capital by advancing credit, leaving a very small margin of security against risk.⁷

In certain parts of the country, notably Taranaki, finance or loan companies have been formed for the express purpose of financing dairy farmers. The companies will lend, say £10,000, holding a bill of sale over stock and a mortgage on the land. The borrower reduces this amount gradually by one-third to one-half of his monthly butter-fat cheque.

A common method of obtaining capital which is seldom used in other types of farming, is by means of share milking agreements which represent a modification of the metayer system. There is no

⁷ Competition among such firms for the farmers' commercial business has encouraged advances on too small a security and they must bear no small share of the blame for the post-war boom and slump. See Condliffe and Belshaw, *op. cit.*, pp. 342-344.

need to describe the system adopted, since it does not differ in essentials from share farming methods elsewhere. It is sufficient to add that while the system is not so efficient technically, as occupying ownership, it has been a very useful rung in the ladder of ownership. Many prosperous farmers have obtained the necessary capital to start ownership in this way.⁸ Speaking generally, the comparative stability and security of the industry, except during the post-war years, and the possibility of steady repayment by means of a fixed proportion of the monthly butter-fat cheque have made dairy farms among the best types of agricultural investment, and the readiness with which the small man can ob-

cheese, dried and condensed milk, lactose, and casein are all manufactured in factories which are generally well equipped. There is no farm-made cheese and only a small quantity of butter is produced on the farm. This is all consumed locally, chiefly for cooking purposes and the like.

In cheese districts, the milk is delivered whole to the factory; but there has been a strong tendency in butter-producing areas for milk to be separated on the farm, since this saves a great deal of the trouble involved in haulage.

To the New Zealander, the size of factories is taken for granted; but foreign observers discuss them with some amazement.⁹ The claim that New Zealand

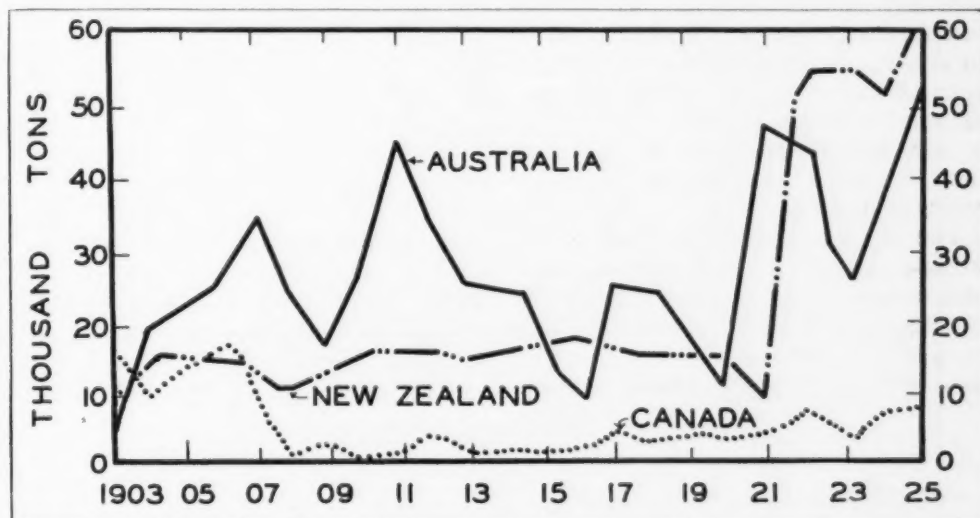


FIGURE 17.—Imports of butter into the United Kingdom from sources within the Empire, 1903-1925.

tain capital and repay it in small sums have encouraged subdivision of larger farms and have been potent factors in encouraging the industry.

FACTORY ORGANIZATION COÖPERATIVE DEVELOPMENT

The factory has ousted forever the farm dairy as a competitor. Butter,

⁸ Although much has been written on the subject of State Advances to Settlers, progressive land taxation, etc., the influences on dairying are too difficult to trace and probably too small to warrant treatment in this article. See, however, *ibid.*, pp. 341-342.

has the largest as well as many of the best-equipped factories in the world is probably no exaggeration.¹⁰

The object of developing large-scale plants is to take advantage of the internal economies in production which tend to increase with increasing size. In an

⁹ See Russell and Macklin, *op. cit.*, pp. 24-25.

¹⁰ The largest butter factory in the United States produces some 2,500,000 lbs. of butter annually (*ibid.*, p. 25). The largest in New Zealand produces nearly 6 million pounds annually, while the average size of butter and cheese factory appears to be very much greater than in Wisconsin, a typical dairying State. (*Ibid.*, p. 25.)

investigation which the writer conducted some years ago, it was found that cost of production—in other words payment to suppliers per pound of butter-fat—increased as size of factory increased. This is broadly substantiated by Messrs. Russell and Macklin.¹¹ After a point, economies in manufacture are offset by longer haulage, but this is becoming overcome by the collection of milk or cream by means of motor trucks.

Payment to suppliers is made on the basis of butter-fat content as measured by the Babcock tester; but the practice is also common of grading cream and paying according to grade in order to encourage a uniformly high level of quality. The same object is attempted by the employment of expert instructors who advise farmers as to methods and attempt to remedy defects. Similarly the level of production on the farm has been materially raised by the formation of coöperative herd-testing associations, though there is still much to be done in grading up stock.

The tendency towards localization owing to topographical or climatic conditions has been intensified to take advantage of the external economies which localization brings. This applies especially through the utilization of by-products. Thus skim-milk from factories is precipitated into casein and cured at central stations; and whey, the by-product of cheese, is collected so that sugar of milk may be prepared in bulk.

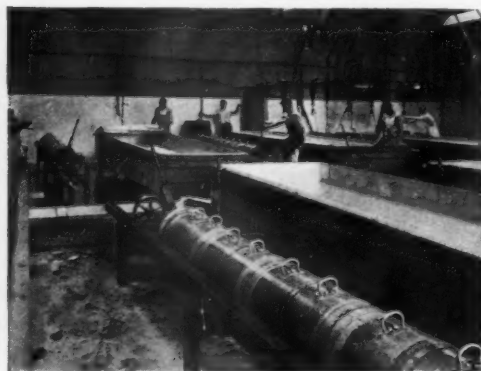


FIGURE 18.—Cheese making at Kaupokanui factory, Taranaki.

Factories are, in general, organized on coöperative principles, and while coöperation has not developed so extensively in New Zealand generally, as in some European countries, yet the movement in dairying is second to none save in its Danish rival. The following figures which illustrate the growth of the coöperative movement since 1910 require no comment:

Year	Total factories	Proprietary concerns	Coöperative concerns
1910-1911 . . .	338	212	126
1915-1916 . . .	348	96	252
1923-1924 . . .	515	52	463

(NOTE.—Figures are calculated from "Statistics of New Zealand," 1918, and from the Annual List of Factories, but are only approximately correct. Nevertheless they indicate accurately enough the growth in importance of coöperative concerns.)

Probably 95 per cent of the total exports is provided by coöperative concerns.

Proprietary concerns are usually situated at centers of population and draw supplies of cream from long distances by rail. They are supplied chiefly with a large number of small lots of cream from farmers who have only a few cows. They engage chiefly in butter production made from home-separated cream. Coöperative factories are usually situated in districts where dairying has become specialized, or at least where dairying is the main concern of the farmers.

Not only has the more difficult task of catering for small suppliers been left to the proprietary concerns, but also the manufacture of new commodities such as dried milk or casein has usually been proved successful by the private entrepreneur before being taken up by the coöperative company. The formation of powerful federations willing and able to experiment and take risks is likely to alter this in the future.

Local societies are often combined into federations, many of them of great size. Factories are developed at the most efficient size for a particular locality and the various factories amalgamate into larger business units in order to effect

¹¹ *Op. cit.*, *loc. cit.*

economies in marketing, administration, and the purchase of requisites.¹²

In addition to coöperation of this sort, factories otherwise independent coöperate in the running of subsidiary enterprises. The most interesting organization of this type, the Egmont Box Factory, Ltd. of Eltham, was formed in 1906 by the Dairy Companies of Taranaki to ensure a supply of butter boxes and cheese crates at reasonable prices. The company owns its own forests and saw mills.

Rennet works, freezing works, cool stores, and coastai snipping are owned and managed in the same way in various parts of the country.

MARKETING

The chief market for New Zealand dairy produce is definitely localized in London. Until recently, it was sold without intermediary to the Tooley Street Merchants or their New Zealand agents. In some cases the merchants merely acted as agents, selling on commission. In others, dairy produce was actually sold to the middlemen, either on consignment—in which case the producer bore the risks of market changes—or in advance, the whole of the season's output being contracted for at a fixed price for the season. The former was the more popular plan.

In 1923, however, a Dairy Produce Control Board was established after it had been agreed upon by a referendum of producers. The Control Board, which has only been in operation for about two years, now has absolute control over the whole of the dairy produce exported from the country.¹³

¹² The largest federation in New Zealand, "The New Zealand Coöperative Dairying Company," operating in Auckland province, is said to be the largest coöperative dairying organization in the world. In 1920-1921, it had eight butter factories, ten cheese factories, three dried milk factories, twenty-four skimming stations, a casein factory, and several casein precipitating stations. The number of suppliers was 4,875, while 4,983 tons of butter and 2,464 tons of cheese were forwarded for export. The estimated value of the turnover was £2,300,000.

¹³ See Russell and Macklin, *op. cit.*, and various Reports of the Board, for further information.

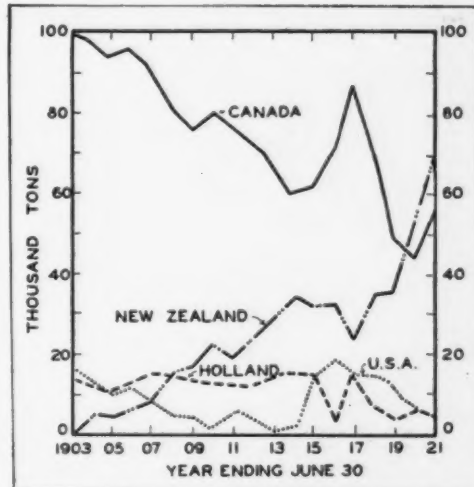


FIGURE 19.—Imports of cheese imported into the United Kingdom from the leading sources of supply, 1903-1920, in thousands of tons.

All dairy produce exported is carefully graded by State officials at the ports, and a highly efficient and uniform system has been evolved. Not only has the system of State grading raised prices by increasing the confidence of buyers in the quality of the product, but also it has been instrumental in considerably improving the quality so that now over 95 per cent of the butter and cheese exported is classed as first grade.

ECONOMIC AND SOCIAL IMPORTANCE OF DAIRYING

In conclusion, it will not be amiss to indicate briefly the importance of the industry in the life of the community. Since dairying is best conducted on small holdings, its rapid development has resulted in the employment of a much greater number of workers (*i.e.* including both employer workers and employees) than would be the case on an equal area devoted to cereal production or sheep raising. In fact, dairying has been both an effect and an important cause of the closer settlement of the country and has stimulated the gradual but continuous increase in rural population. This influence is illustrated in the following figures showing the number of



FIGURE 20.—Loading cheese for shipment to the London market. (Courtesy of Publicity Office, Government of New Zealand.)

workers in the three main rural industries:

NUMBER OF WORKERS OCCUPIED			
Year	Agriculture (Mainly Cereals and other Arable Crops)	Pastoral Pursuits (Mainly Sheep and Cattle)	Dairying
1901.....	62,310	11,884	6,074
1906.....	64,224	14,841	11,391
1911.....	48,226	26,903	26,297
1916.....	34,979	38,586	63,794

(After Copland, "Wheat Production in New Zealand," p. 199 and "Census Returns," 1916, Vol. IX.)

In so far as the town drift is to be deplored, dairying has been a beneficial influence on the distribution of population, and has encouraged the development of a stalwart yeomanry, self-reliant and vigorous. *Prima facie* also, it has led to a more even distribution of wealth than general agriculture or sheep farming would have done. Since there has been no evidence to show that the subdivision of larger farms has led to a lowering of the yield per unit of labour expended, this can only be considered as beneficial, especially as it has certainly increased greatly the value of output per acre. Further, many of the recruits for the dairying industry come from the towns, so that the competition for town

employment has been thereby reduced, to the advantage of the wage rate. In addition dairying has increased the demand for labour through the development of the secondary industries based upon it.

Further, since dairying is an industry bringing in a continuous return for the greater part of the year, is less influenced than cereal production or sheep farming by sudden adverse conditions in the weather, and—except for the post-war years—has suffered few serious fluctuations in demand, it has provided a stabilizing influence on the demand for the secondary—*i.e.* manufactured—products of the country. In the words of Dr. McIlwraith, a New Zealand economist: "We must regard the rapid development of the dairying industry as one of the greatest factors in promoting increased prosperity, commercial stability and social prosperity."¹¹

It is almost certain that within a decade or two at the most, the dairying industry of New Zealand will have expanded far beyond its present proportions, and will have displaced sheep raising in first position.

¹¹ "The Course of Prices in New Zealand."

AGRICULTURAL PRODUCTION IN CHINA

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IT has been estimated that one may find over 4,000 people to the square mile in some of the most densely populated agricultural regions of China. Mallory states that in the rice-growing provinces of Chekiang and Kiangsu a recent survey has shown "that the number of inhabitants to the square mile varies from 980 in some village districts to 6,880 in others" (Fig. 1). No greater tribute could be paid to the Chinese. That ancient people, with its so-called "crude" methods, has lifted agriculture into the realm of the arts, for only an artistic people could work the earth in such a way that one square mile should produce sufficient food to provide nourishment for four thousand people. It is doubly astonishing, when one notes that such superproductivity is obtained by the use of power almost entirely in the form of human labor. It is fitting, therefore, that an attempt should be made to discover where and how the Chinese are able to gather such harvests.¹

THE AREA OF CHINA

The total area of the 18 provinces of China proper (Fig. 2) is about 981 million acres, or a little over one-half that of the United States. If Manchuria be added the total area becomes 1,214 million acres, or nearly two-thirds that of the United States, and if Mongolia and Sinkiang be included the total area is increased to 2,441 million acres, which is nearly a third larger than that of the United States. Tibet is omitted because Chinese control over that country seems temporarily lost.

When the map of China is superimposed on that of the United States (Fig.

2) it is found that Peking lies south of New York, and that Canton is almost on the same parallel as Havana, Cuba; while Cheng-tu, the administrative center of the province of Szechwan, coincides in latitude with New Orleans. Therefore, other things being equal, China would have much the same solar climate as the Southeastern United States.

As in the United States, the eastern portion of this vast Chinese Republic, especially the southeastern portion, is humid, while the western and north-western part is arid, more arid than our western states. Although climatic data are few and scattered, it appears that nearly half of the 2,440 million acres of land in the Republic is too arid for crop production (Fig. 3).

China has a more southerly location than the United States, the center of area and of population also, lying at about latitude 30 compared with about latitude 40 for those two centers in America. As a consequence only a very small portion of the area having sufficient rainfall for crop production in China does not receive also sufficient heat. This land, too cold for crop production in China, is practically restricted to the mountain peaks and arid plateaus. The area of these high altitude lands, too cold for crop production, probably does not exceed 5 per cent for the remaining area. Subtracting this from the 1,284 million acres having sufficient moisture for crop production, there remains roughly 1,220 million acres having both moisture and temperature conditions that permit the production of crops.²

In view of the fact that China proper contains many mountainous areas, and

¹"China: Land of Famine," W. H. Mallory, *Amer. Geog. Soc., Spec. Pub., No. 6*, 1926, p. 15.

²Data dealing with Land Utilization obtained from an unpublished manuscript, loaned by Dr. O. E. Baker.

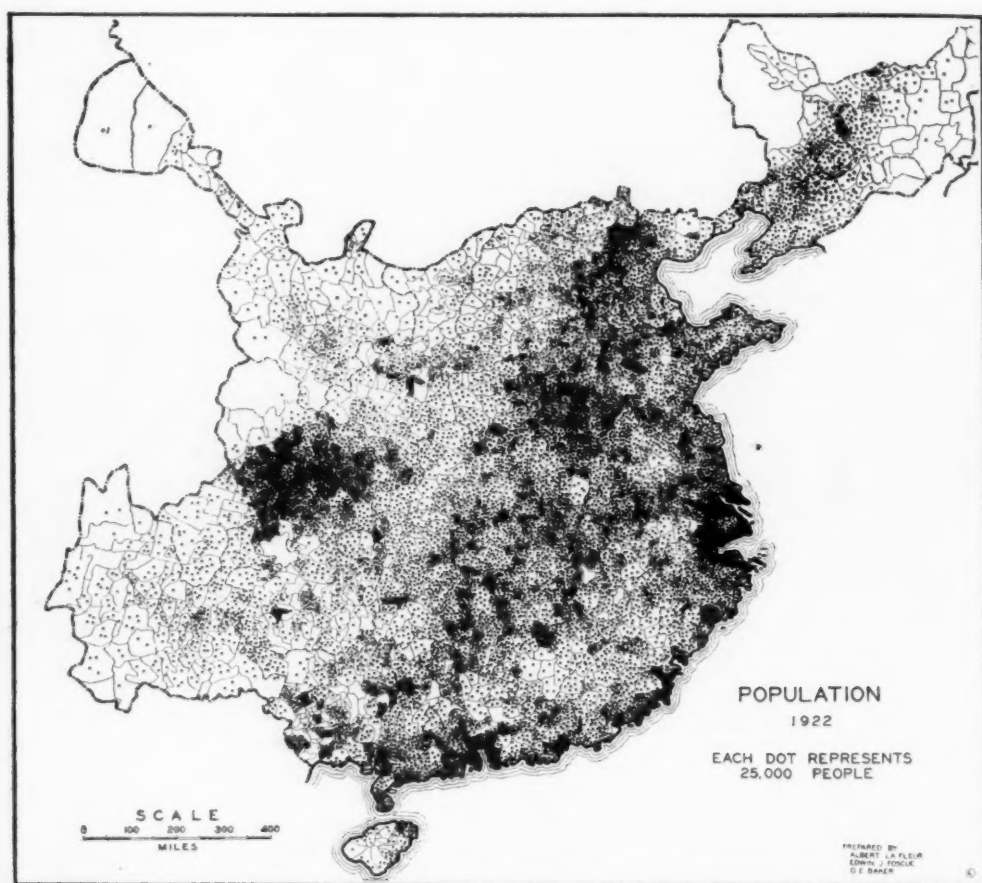


FIGURE 1.—The population of China Proper and Manchuria according to the Post Office estimates for 1922 was approximately 437 million people. The densest population is along the coast, especially near Shanghai, in the lowland area that extends from Peking to Nanking and Hankow, and in the western Red Basin of Szechwan. Source: *China Year Book*, 1926, and *The Christian Occupation of China*. (Map copyrighted by Albert La Fleur, Edwin J. Foscoe, and O. E. Baker.)

like the eastern part of the United States has mostly a humid climate where erosion is rapid, it appears that at least 40 per cent of the 1,220 million acres of land climatically suitable for crop production are topographically unavailable for agricultural purposes, thus leaving roughly 740 million acres climatically and topographically available for crop production.

Furthermore, though the soil conditions are more readily ameliorated by man than these other physical conditions, and therefore it is more difficult for one to set a soil limit to crop production, it appears that the 740 million acres must be further reduced by 5 per cent to allow

for unproductive soils, or approximately to 700 million acres.

To summarize these deductions, it seems that out of the total land area of China but 29 per cent is available for the production of crops, while in the United States the corresponding proportion is 51 per cent.

LAND UNDER CULTIVATION

In 1918 there were about 176 million acres of cultivated land in China, or about one-fourth of the area climatically and topographically suitable for crop production (Fig. 4). The area of cultivated land per person in the Chinese Republic was roughly 0.40 acres, but

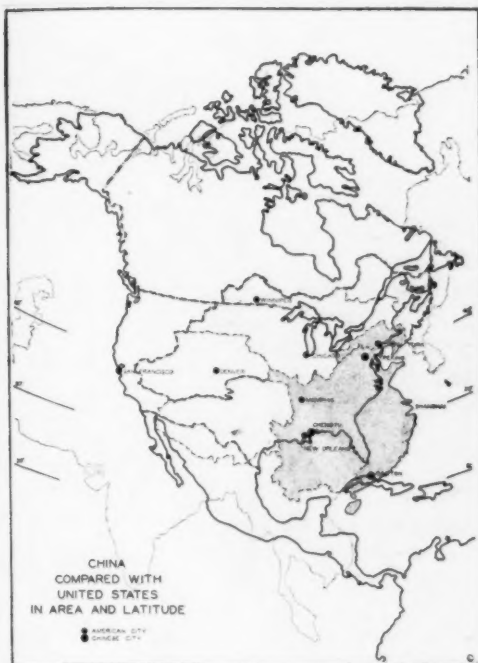


FIGURE 2.—China compared with the United States in area and latitude.

this includes the sparsely populated provinces of Manchuria, Mongolia, and Sinkiang. If China proper be considered, the average amount of land per person is somewhat lower, being 0.38, whereas in the United States it was 3.4 acres (Fig. 5). In other words, there seem to be about eight times as much cultivated land per person in the United States as in China. Why should China cultivate only one-fourth of her cultivable land, when she is in constant need of food for her teeming millions? The answer may only be suggested here; and that is, China lacks machinery and its corollary—power, and cannot afford to farm the marginal lands. One must bear in mind, however, that the American citizen has access to the world markets, while the average Chinese peasant has not.

THE CROPS

The three food crops—rice, wheat and the sorghum-millets—occupy 69 per cent of the cultivated land (Fig. 6). Rice is the most important food crop in China,

and wherever this cereal may be grown it is given first choice of the land, especially in the south where the climatic conditions are such that the peasants need a crop which can be kept for a long time during the hot humid season. Rice is well adapted for storage of this type because it has a husk which serves as a natural protection and enables the storing of the grain for long periods.

Wheat and the grain sorghums become dominant in the northern and the more arid western sections and replace rice as the choice crop. The recent increased production of the soy-bean with all its vast possibilities may slowly supplant even the wheat.

Of especial interest in the chart is the extent to which the Chinese are using their cultivated land for the food crops; very little land is devoted to the fiber and forage crops because the first re-

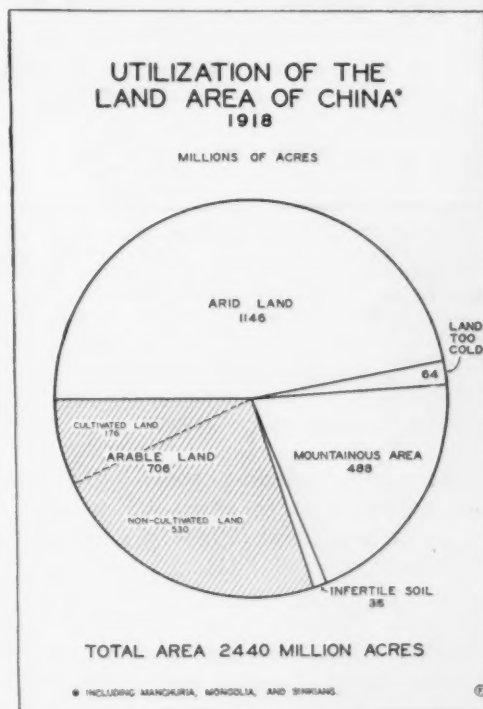


FIGURE 3.—The amount of arable land in China (exclusive of Tibet) is approximately one-fourth of the total area. Only about one-fourth of the arable land is at present under cultivation. (Based on preliminary estimates made by O. E. Baker.)

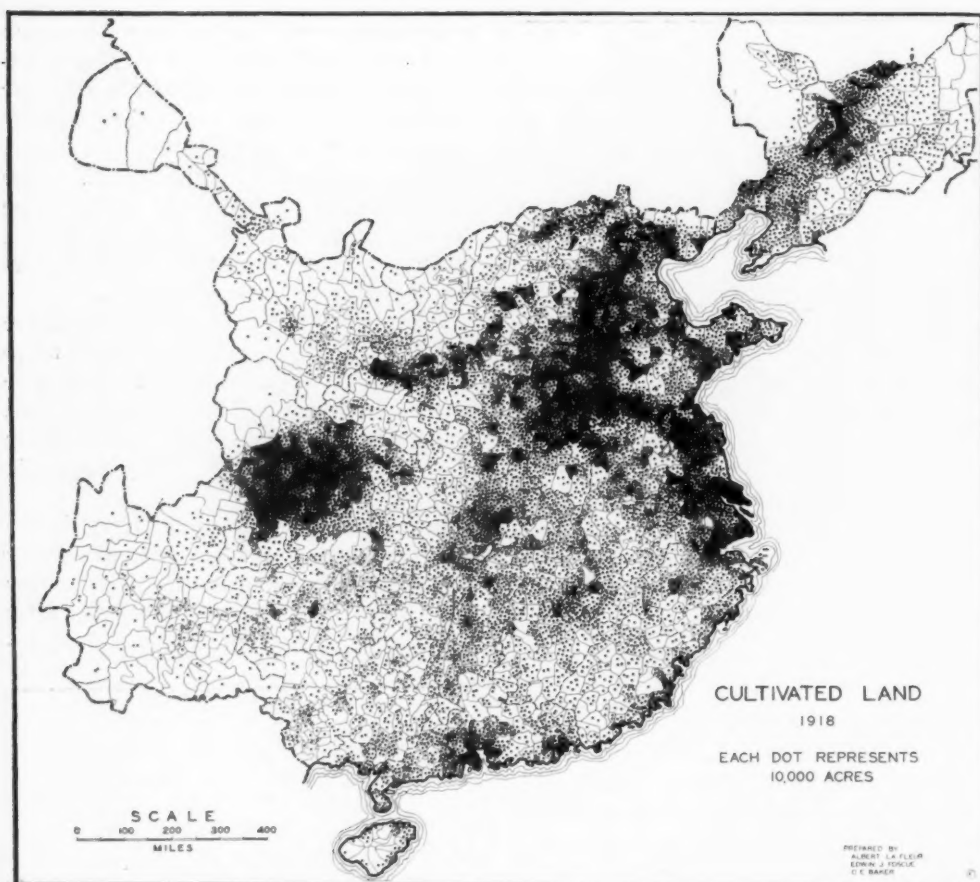


FIGURE 4.—The area of cultivated land in China Proper and Manchuria was about 180 million acres in 1918. This estimate is based on the figures published in "Statistical Tables of Agriculture and Commerce," Peking, 1918, which were hastily edited by *hsiens* (counties) for typographical and other errors, especially obvious in Honan and Hupeh. The areas of densest cultivation are in eastern China, along the fertile valleys of the Hwang-Ho and the Yangtze Rivers, and in the famous Red Basin in Szechwan. For the translation of the *hsien* names, the authors are indebted to Miss Huang Yü Jung and Mr. J. H. Chen. The distribution within a province of the acreage of each of the crops shown in succeeding maps has been based largely on these cultivated land figures. Statistics are available for the crops by provinces only, and not by *hsiens*. (Map copyrighted by Albert La Fleur, Edwin J. Foscué, and O. E. Baker.)

quirement of the dense population is food, and naturally those crops which yield the greatest amount of food per acre are given first choice of the land.

Rice

Rice is China's most important crop. It is grown on about 28 per cent of the cultivated land in China proper, and on as much as 70 per cent of the cultivated land in the southern provinces of Kwangtung, Kiangsi, Fukien, Kwangsi, Kweichow, and Chekiang (Fig. 7).

Lowland rice is the dominant type and is planted, cultivated, and harvested by hand—men, women, and children working in the fields from early morn till late at night. The acre yields are high, being roughly 1,750 pounds compared with the American production of 1,262 pounds. However, the use of machinery in the United States permits the American producer to ship part of his surplus product to China and find there a ready sale in the local markets at a profitable price. The ability to compete with



FIGURE 5.—Identification map and utilization of the land. The acres per farm, acres per capita, and people per farm are given for each province. (Preliminary estimates only.)

Chinese rice is due not only to cheaper methods of production, but to the fact that it is often impossible for the Chinese to buy rice one hundred miles inland and transport it over nearly impassable roads on the backs of coolies, whereas they can secure rice directly from America. The comparative acreage and total production of China and the United States may be seen in Figure 8.

Wheat

Replacing rice in the northern regions, wheat is the second most important crop in China. Grown primarily in the northern half of the country because of climatic conditions, it occupies about one-fourth of the cultivated land and in certain places as much as 40 per cent (Fig. 9). The yields per acre are somewhat lower than in the United States, and China may find a source of much additional food just as soon as the acre yields are increased to their maximum point. There seem to be grounds for supposing that the Chinese will be calling soon for agricultural machinery with which to exploit the vast marginal areas out in the semi-arid northwest, just as we are doing in this country. With the reestablishment of peace, and the construction of transportation lines, much

American farm machinery should find its way into China.

Sorghums and Millets

The grain sorghums and millets play a very important part in Chinese agriculture, occupying an area of 26 million acres, which is 20 per cent of the cultivated land area. These crops rank next to wheat in importance, but are being slowly crowded out by the soybean. They are grown in each province, but with concentration chiefly in Chihli, Shantung, and Honan, where one-third of the cultivated land area is devoted to their production (Fig. 10). The greater use of the grain sorghums and millets in China compared with the United States is due, probably, to the denser population and the consequent lower purchasing power of the natives. Incidentally, it seems as if the Chinese are pointing the way for the more intensive

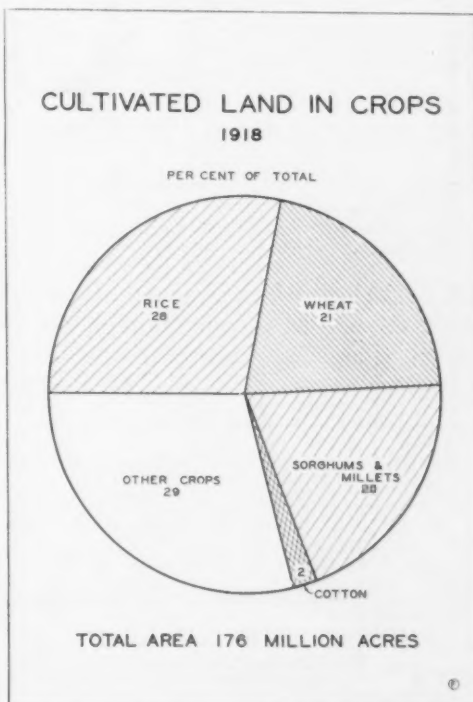


FIGURE 6.—Approximately three-fourths of the cultivated land of China is occupied by the three major food crops—rice, wheat, and the sorghums-millets. (Based on preliminary estimates.)

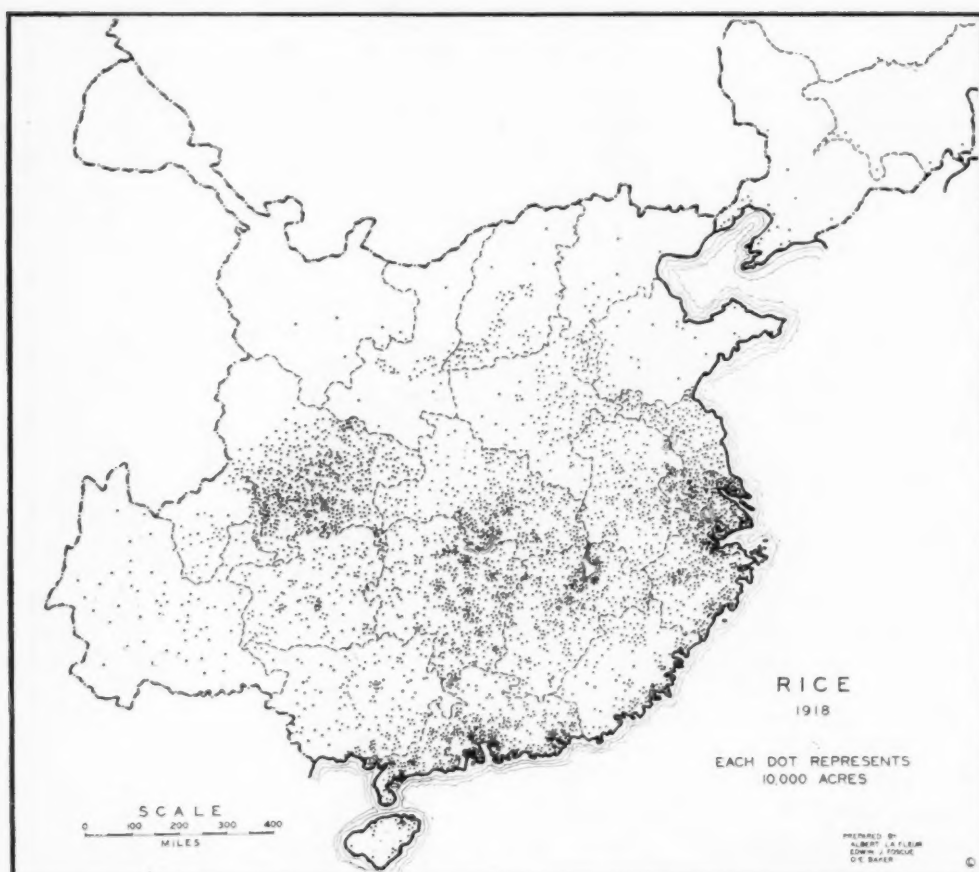


FIGURE 7.—Rice is grown chiefly in the southern provinces. The total area under rice cultivation is approximately 50 million acres. (Map copyrighted by Albert La Fleur, Edwin J. Fosque, and O. E. Baker.)

use of the land which the western nations must follow just as soon as their population causes an increased feeling of pressure.

Soy-Beans

Recently the soy-bean has been gaining in importance. Long known in China, it was little used because its qualities

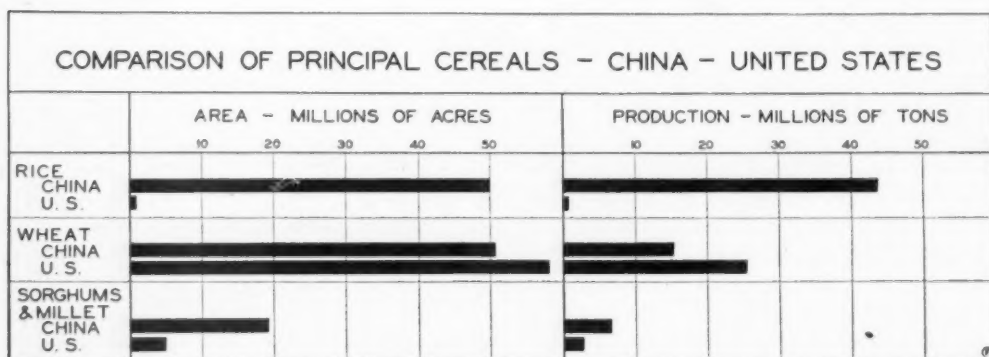


FIGURE 8.—The area and production of rice in the United States is insignificant compared with China. China produces less wheat, but more sorghums and millets, than the United States.

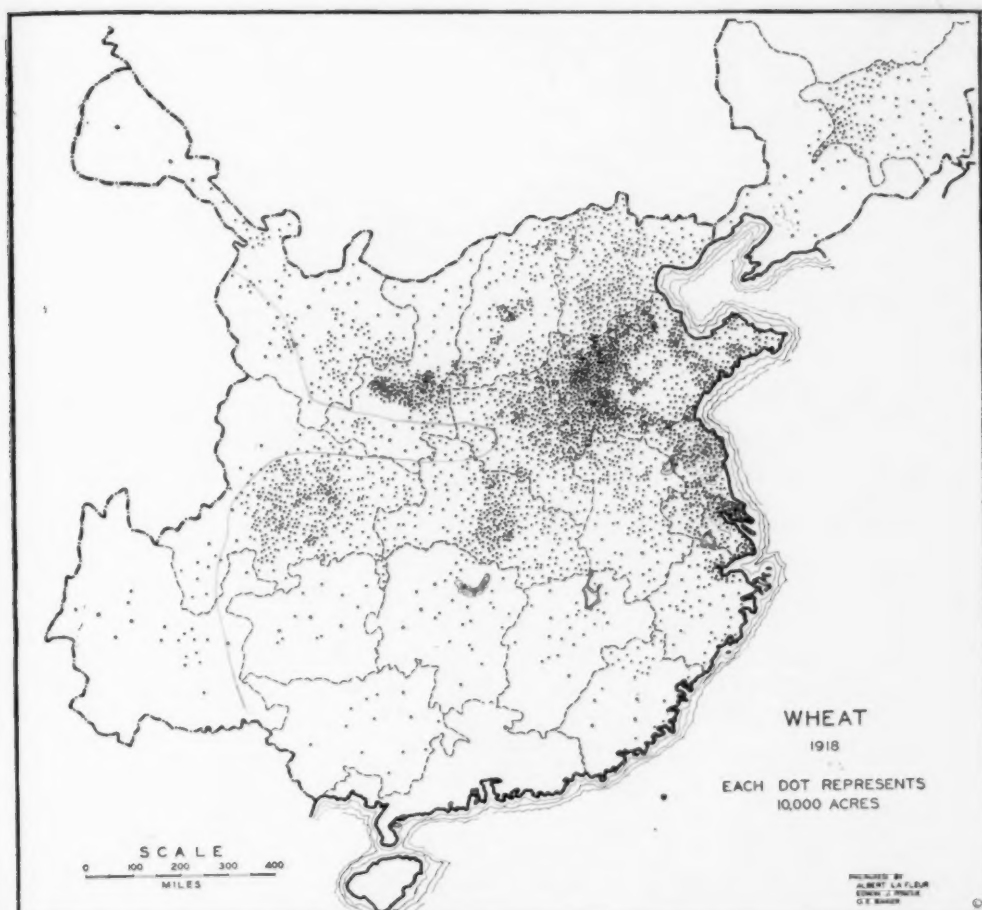


FIGURE 9.—While rice is concentrated in the south, wheat is found chiefly in the less humid northern provinces. (Map copyrighted by Albert La Fleur, Edwin J. Foscue, and O. E. Baker.)

were not known, and its rancid taste, when not properly handled, caused the Chinese to dislike it. Experiments in the agricultural schools both in China and in Japan have shown, however, that the soy-bean could be used as a perfect substitute for milk, meat, and dairy products, and as a source of oil and medicine. So large have been the profits obtained from soy-bean production that a very noticeable increase in acreage has taken place within the last few years. It has been suggested also that the low consumption of meat and dairy products in China might be explained, in part, by the use of the soy-bean. Farmers in our own Corn Belt might do well to consider the practicability of further developing

the soy-bean more extensively in case the corn borer should seriously curtail production of the corn crop.

Cotton

Cotton is not grown extensively in China. This is due probably to (1) the ease with which cheap cotton goods may be imported from India, Japan, and the United States; (2) the small clothing requirements of the peasants; and (3) the especial need to reserve the cultivated land area for the more important food crops. The cotton crop is grown in the provinces of Chihli, Shantung, Kiangsu, Hupeh, Shansi, and Shensi with lesser amounts in several other provinces (Fig. 11). Women, in general, take care

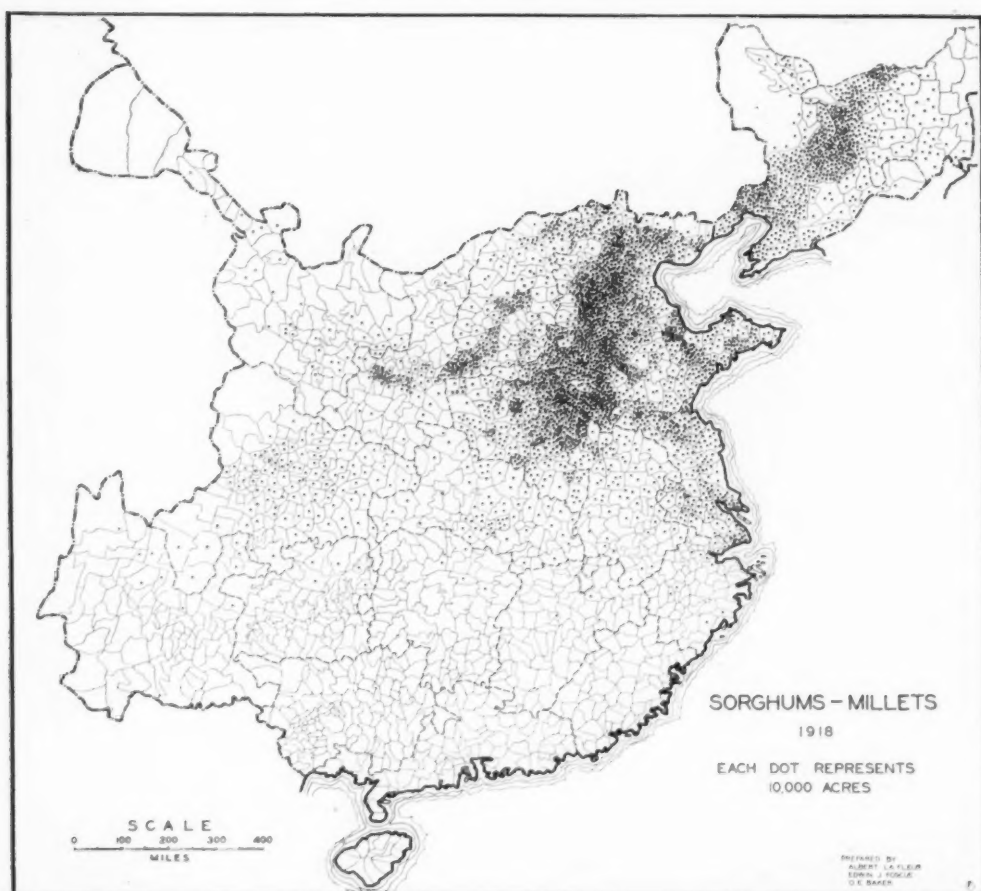


FIGURE 10.—Sorghums and millets are grown chiefly in the northeastern provinces and in Manchuria. (Map copyrighted by Albert La Fleur, Edwin J. Foscoe, and O. E. Baker.)

of the cotton crop because the character of labor needed in its production especially in picking is well suited to their strength. Scientific methods of tillage are unknown; therefore, much of the crop is lost through the ravages of insects and by the use of inferior seed.

THE ANIMALS

The series of maps showing the distribution of animals indicate that there are more or less distinctive centers of concentration. The map representing the distribution of horses and mules emphasizes the concentration of these animals in the northern and western parts of China, while there is a decided lack of animals of this type in the south. The cattle map shows a heavier con-

centration in the south compared with the north. Sheep are more numerous throughout the semi-arid belt in the northern and the western provinces. Swine, on the other hand, have a more general distribution and together with poultry, seem to be in evidence on every farm, being used, no doubt, as the basis of the meat supply for the Chinese farmer. The larger animals are used for power rather than for meat.

Horses and Mules

China, including Manchuria, has approximately 9 million horses and mules, compared with the 24 million in the United States. The centers of greatest density are found in northern Chihli and in Manchuria (Fig. 12). In the



FIGURE 11.—Cotton is a less important crop in China than in the United States. Most of it is grown in the central and northern provinces. Because of the great demand on the land for foodstuffs, it seems unlikely that China will ever be as great producer of cotton as the United States.

south, especially in the rice fields, the horse gives way to the cow or to the water buffalo. This change from horses to cattle is due, in part, to the differences in climate, differences in the type of work demanded of the animals, and differences in the standard of living of the natives. The southern provinces are poorer, in general, than the northern provinces.

There are in the United States roughly 250 horses and mules per 1,000 population, whereas in China the average is 23 per thousand; the Chinese horse is also inferior in size. The peasants have no means of communication with the agricultural schools except by word of mouth, for they cannot read, and until more general education makes the printed ma-

terial available, not much improvement in animal breeding can be hoped for.

Cattle

When cattle are thought of in the United States, they are considered in terms of beef or dairy cattle. In China, cattle are used primarily as draft animals. There is a certain amount of grazing and dairying in the northern and western semi-arid regions, but it plays a very minor part in the agricultural life of the nation. The Chinese make practically no use of dairy products, and the bulk of the people consume a very meagre amount of meat; in spite of this they have lived for centuries on what appears to have been a well-balanced diet by the use of the soy-

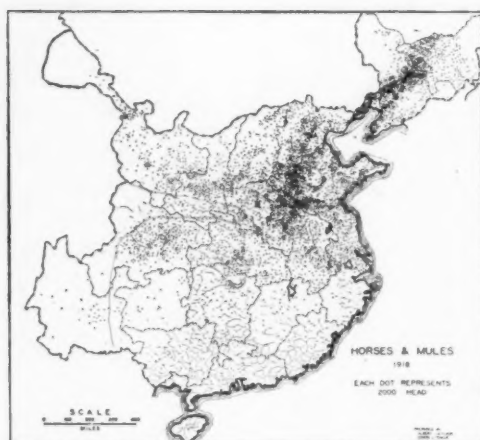


FIGURE 12.—Horses and mules are found chiefly in the northern provinces and in Manchuria. In the south their place is taken by cattle and water buffalo. (Map copyrighted by Albert La Fleur, Edwin J. Foscue, and O. E. Baker.)

bean and other legumes, supplemented occasionally with fish.

The centers of density of cattle are found in the central and the southern provinces, in marked contrast to the concentration of horses in the northern

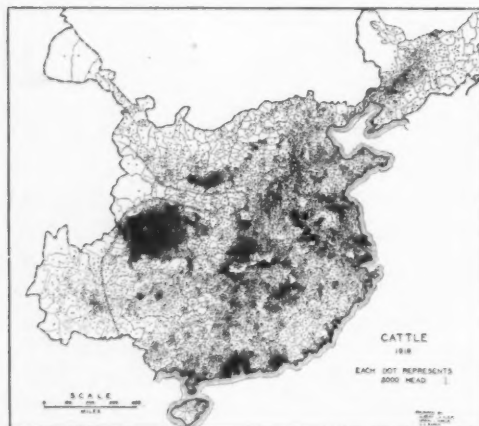


FIGURE 13.—Cattle are found largely in the southern provinces and the Red Basin of Szechwan. They are used chiefly as draft animals. (Map copyrighted by Albert La Fleur, Edwin J. Foscue, and O. E. Baker.)

provinces (Fig. 13). China, including Manchuria, has roughly 20 million head of cattle compared with the 60 million head in the United States. The improvement of cattle breeding is not practiced. In

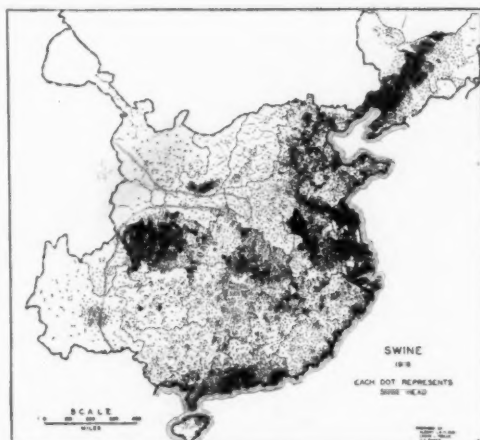


FIGURE 14.—Swine are widely distributed over China. The four most important areas of density are in the Canton region, the area northwest of Shanghai, southern Manchuria, and the Red Basin of Szechwan. (Map copyrighted by Albert La Fleur, Edwin J. Foscue, and O. E. Baker.)

the region of Inner Mongolia a dairying industry has been established recently, with a Swiss family at the head, and it appears reasonable to suggest that this is but the beginning of a far more extensive industry.



FIGURE 15.—The province of Kansu in the arid northwestern part of China is the most important sheep-producing region.

Swine

The production of swine for home consumption has been established so long that it is an institution in China. The 60 million swine are distributed rather evenly throughout the provinces; this

seems to indicate that each farm produces its own meat supply. China has as many swine as the United States, but the meat-packing industry as developed in the United States does not exist in China. Local meat-packing plants have been established in a few of the larger cities, but the individual farmer with his salt barrel probably takes care of nine-tenths of the supply. In America the heavy concentration of swine is in the Corn Belt, in direct response to geographic and economic conditions attendant upon commercial production. In China the lack of a Corn Belt, plus the ability of the hog to thrive on refuse, leads to a more widespread distribution (Fig. 14).

There are no special types of bacon or lard hogs in China; breeding is carried on in the crudest manner and the peasants can never hope to make any progress until the recent improvements in hog breeding are made available through the medium of mass education. At present, not one farmer in 10,000 can read or write; therefore, everything is carried on according to custom. It appears doubtful whether extensive meat-packing plants will ever be developed in China, but there is little doubt that, with the advances now being made in that country, animal breeding will be raised to a much higher level.

Sheep

The densest center of sheep production is located in the western and north-western semi-arid provinces (Fig. 15). Raised primarily for their wool, they graze over the open ranges under the care of the sheep herders. The Chinese sheep herders are handicapped by the lack of transportation facilities, and by the lack of knowledge which would permit the introduction of more pure blood animals. In 1918 the number of sheep in China was estimated at about 22 million head, but there appears to be much room for the expansion of that industry out on the marginal lands of Inner Mongolia and even in the mountainous areas of China proper. The meat of the animals is con-



FIGURE 16.—Poultry are widely distributed over China. The three most important producing regions are the Canton district, the lower Yangtse valley west of Shanghai, and the Red Basin of Szechwan. (Map copyrighted by Albert La Fleur, Edwin J. Foscue, and O. E. Baker.)

sumed locally, or is allowed to go to waste simply because the great distances to market exclude the shipment of anything except products of small bulk and great value.

Poultry

The comparative ease with which poultry and poultry products may be produced for market, either in the form of meat or in the form of eggs, permits most farmers to possess a flock of five or six. (Fig. 16). In general, the meat is for domestic use, but the eggs have always found a market in the cities and are being sold now on the American market. Eggs intended for overseas are inspected at least three times before they leave China and at least twice before they are placed on sale. This rigid inspection results in the delivery of Chinese eggs to the American markets, for instance, in as good a condition as eggs produced in America and held in cold storage for twelve months before they are sold. One writer has suggested that chickens should be raised instead of the multitudinous pack of mongrel dogs that greet one as he approaches a Chinese village—at least the chickens could be used for food and thus pay for their keep.

SUMMARY

China is faced with many major problems. Her cultivation of the soil has been extremely intensive and with the introduction of more scientific methods she can increase her productive capacity

even more. These improvements, however, pivot upon the establishment of a strong peaceful government, that will permit untrammelled development of her agriculture and continuous extension of production out upon lands now untilled and unoccupied.

AGRICULTURAL REGIONS OF NORTH AMERICA

PART III—THE MIDDLE COUNTRY, WHERE SOUTH AND NORTH MEET

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CORN AND WINTER WHEAT BELT

THE Corn and Winter Wheat Belt is a transition zone between northern and southern agriculture, the crops and systems of farming being much the same as in the North, but the people and the social traditions, except in Kansas, similar to those in the South. The region extends from the Flint Hills of Kansas to the Coastal Plain in Virginia and New Jersey, and includes north-eastern Oklahoma and most of eastern Kansas, southern Missouri and the Ozark portion of Arkansas, southern Illinois and Indiana, a little of south-western Ohio and of West Virginia, practically all of Kentucky and most of Tennessee, western North Carolina, most of Virginia and Maryland, except the lower tidewater portions, and south-eastern Pennsylvania (Fig. 79). The belt is about 1,100 miles long and varies from 125 to 325 miles in width, the average being 225 miles. It contains an area of about 168 million acres, or 9 per cent of the land area of the United States, and produced in 1919 crops valued at over \$2,000,000,000, which was 14 per cent of the total for the United States. There are 1,300,000 farms in the Corn and Winter Wheat Belt, which is 20 per cent of the farms in the United States.

The three almost universal and usually dominant crops are corn, winter wheat, and hay, which constituted 35, 17, and 13 per cent respectively of the value of all crops in 1919, but tobacco and fruits are also very important in several localities, sometimes exceeding wheat in value. The acreage of pasture is more than half that of the crops and a large proportion, about three-fourths, is improved. The

acreage of forest and cut-over land approaches that of the crop land and pasture combined, and the receipts from the sale of timber and tan bark constitute an important source of income in the hilly portions of the Belt.

PHYSICAL CONDITIONS

The Corn and Winter Wheat Belt is a region of great diversity of topography and soils, but is more uniform in climate than most of the other agricultural regions of the continent.

Boundaries

The southern boundary of the Corn and Winter Wheat Belt is climatic, *i.e.*, it is the northern margin of cotton production; but the northern boundary, along the Corn Belt, is not climatic—it is the line where, in general, the surface of the land becomes smoother and the soils more fertile, the production of corn to the northward exceeding 3,000 bushels per square mile. From Ohio westward to central Illinois it is the southern limit of the Wisconsin or latest glaciation. Both corn and winter wheat extend across this northern boundary, the corn becoming more important and the wheat relatively less important. Across Missouri, the boundary corresponds in general with the northern margin of the hilly or rough lands of the Ozark region, the forests also giving place to the prairies to the north. In eastern Kansas the boundary is owing primarily to the dominance of corn on the less leached and richer soils to the north. Here in eastern Kansas the dominance of corn may advance through three or four counties when corn is high in price and wheat is cheap, and then retreat with a

rise in price of wheat. This is true nowhere else along this boundary line. Far to the east, where the Belt adjoins the Hay and Pasture Region, the northern boundary is largely climatic; it is where the climate becomes cooler, owing to the elevation of the Cumberland and Allegheny Plateaus, and hay and pasture become more important than corn and wheat.

The eastern boundary is ascribable to both climate and soils. It is located where the wheat and hay, grown on the heavy soils of the Piedmont and Upper Coastal Plain, give way to the vegetables and small fruit crops of the sandy Lower

becomes insufficient to percolate entirely through the soil, with the consequent accumulation of lime carbonate in the subsoil, the characteristic of a sub-humid climate.

Climate

The differences in temperature between the southern and northern boundary of the Corn and Winter Wheat Belt, and in rainfall between the eastern and western boundaries, are less than in any other eastern agricultural region; nevertheless, there are locally many marked variations in climatic conditions within the boundaries of the region, owing principally to

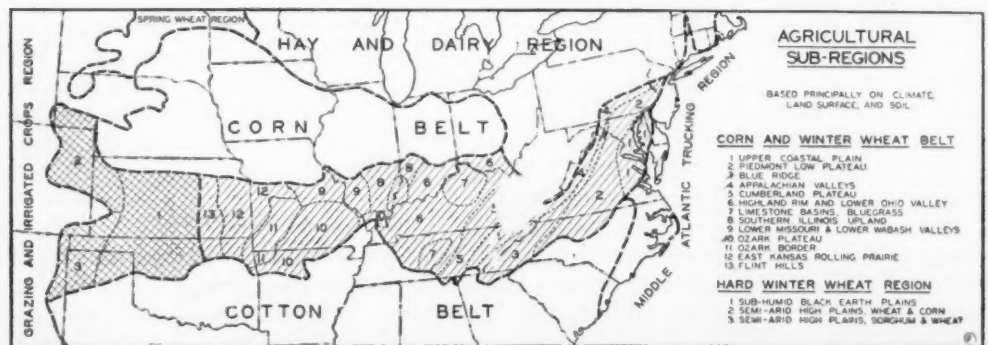


FIGURE 79.—The Corn and Winter Wheat Belt, which is lightly shaded on this map, lies between the Corn Belt on the northwest, the Hay and Pasture Region on the northeast, and the Cotton Belt on the south. It does not extend quite to the Atlantic Coast on the east, because in the sandy lower portion of the Coastal Plain, with its mild climate, the production of early vegetables for the large markets nearby becomes more important than the production of corn and wheat; in fact, practically no wheat is grown in this sandy coastal region. Along the western margin the Corn and Winter Wheat Belt merges into the Hard Winter Wheat Region, shaded somewhat more heavily on the map. Within the Corn and Winter Wheat Belt there are wide differences in the use and productivity of the land, owing primarily to physiographic conditions. These physiographic differences give rise to agricultural sub-regions, which are named, and their locality shown on the map. Within the Hard Winter Wheat Region there are likewise great differences, but these are owing principally to the diminishing rainfall toward the west, and decreasing temperature toward the north.

Coastal Plain. In the Piedmont and Upper Coastal Plain area, the winters are moderately cool, whereas in the trucking region of the Lower Coastal Plain, the winters are much milder, indeed almost marine in character. The western boundary of the Corn and Winter Wheat Region is both climatic and topographic. It is located where the grazing lands of the Flint Hills subside into the wheat plains of western Kansas and Oklahoma. Beyond this boundary the rainfall rapidly diminishes, and within 50 miles or so

differences in altitude and slope of the land. The heaviest annual precipitation in the eastern United States, 60 to 80 inches, occurs on the southern slopes of the mountains in western North Carolina; whereas along the western margin of the region in eastern Kansas, the annual precipitation averages 30 to 35 inches (Fig. 3).¹ In the originally forested portion of the Belt the annual precipita-

¹ ECONOMIC GEOGRAPHY, October, 1926, issue; *Agricultural Regions of North America*, Part I, by the author.



FIGURE 80.—A typical farmstead near Purcellville, Virginia, showing the gently rolling fields characteristic of the Upper Piedmont. In the distance the Blue Ridge can be seen. The Upper Piedmont is a lovely country and contains some of the finest stock farms in the United States. (Photo by H. A. Miller, U. S. Dept. of Agr.)

tion is mostly between 40 and 50 inches, in the western (tall grass) portion 30 to 40 inches. Throughout the region there is sufficient moisture to percolate entirely through the soil and form a water table, *i.e.*, the region is humid. In the western portion of the Belt about three-fourths and in the eastern portion about three-fifths of this precipitation occurs

ranges in general from 180 days along the northern border to 200 days along the southern, but is a few days shorter in northern Kansas and in most of the Appalachian and Ozark mountain portions (Fig. 4).² The average summer (June, July, and August) temperature is 75 degrees along the northern boundary, (only 72 degrees in eastern Pennsylvania)



FIGURE 81.—Fodder in the shock in the Shenandoah Valley near Berryville, Virginia. The level to rolling surface of the land in this region is shown very plainly. One of the mountain ridges that bounds the valley can be faintly seen on the left. The corn has been shocked and wheat seeded in the corn stubble. With the wheat probably timothy and clover seed has been sown. After the wheat is harvested, this mixed hay crop will occupy the land constituting the third and, very likely, the fourth years in the rotation. (Photo by H. A. Miller, U. S. Dept. of Agr.)

during the frost-free season. June and July have the heaviest rainfall in the western and central portions of the Belt, but August is wetter in the eastern portion.

The length of the frost-free season

and is about 77 degrees along the southern border. The mean winter temperature along the northern border is 30 to 32 degrees, or close to the freezing point, and along the southern border it is a few

² *Ibid.*



FIGURE 82.—The lay of the land and the characteristic crops in the Blue Grass sub-regions of Kentucky and Tennessee and in the more level portions of the surrounding Highland Rim sub-region are here illustrated. In the foreground is a tobacco field, in the distance to the right is a corn field, and on the left a hay field. Only a wheat field is needed to complete the picture. (Photo of experimental farm near Clarksville, Tenn., by R. H. Milton, Office of Tobacco Investigations, U. S. Dept. of Agr.)

degrees warmer. The summers, in other words, are warm, and the winters are moderately mild and characteristically muddy, with almost daily freezing and thawing of the soil.

Topography

The Corn and Winter Wheat Belt is characterized by an extraordinary diver-

sity of topographic conditions; in fact, it is an aggregate of dissimilar topographic sub-regions united by similar climatic conditions, which have favored the general dominance of corn and winter wheat. The land of the Upper Coastal Plain is level to rolling, and merges into the Piedmont Low Plateau, which has mostly a rolling surface except for many



FIGURE 83.—Cattle for export on mountain pastures in southwestern Virginia. Most of the land in the southern Appalachians is too steeply rolling for crops, but is well adapted to pasturage. Only the fairly level field near the house appears to be in corn. Where the surface is too steep or stoney for pasturage, as on the ridge in the background, the land is allowed to remain in forest. In general, land having over 15 feet fall in 100 feet horizontal distance should not be used for crops, and that having over 25 feet slope in 100 feet distance should be used for forest. (Photo by J. S. Cotton, U. S. Dept. of Agr.)

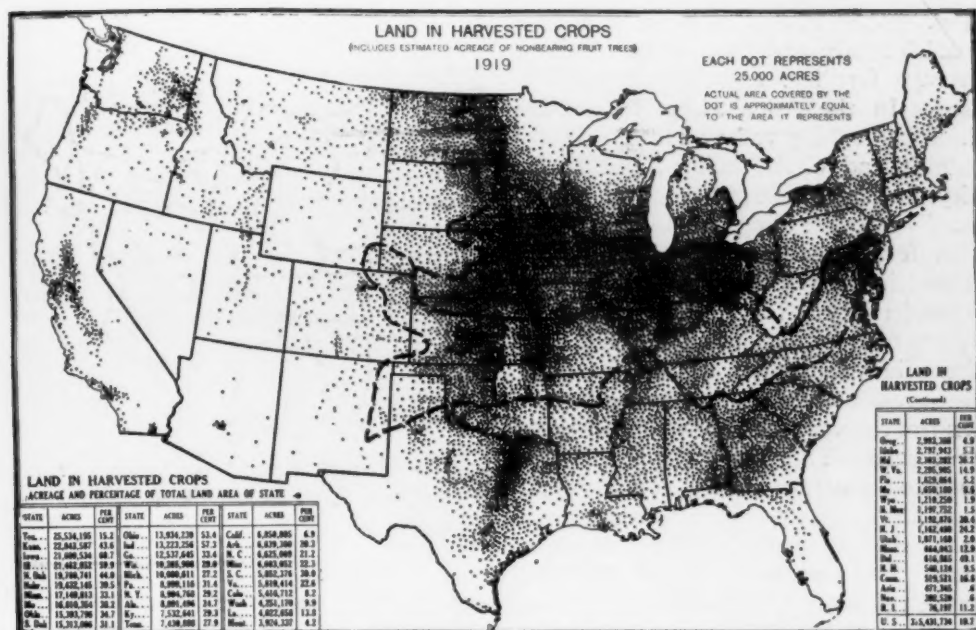


FIGURE 84.—In general, a smaller proportion of the land in the Corn and Winter Wheat Belt is in crops than in the Hard Winter Wheat Region to the west, particularly in the eastern section, or in the Corn Belt to the north. The districts of densest crop acreage, it will be noted, are the Piedmont of southeastern Pennsylvania and central Maryland, the level to rolling upland of southern Illinois and Indiana, and the prairie plains of eastern Kansas and western Missouri. The sparsity of crop acreage in the mountains of western North Carolina, in the Cumberland plateau of eastern Kentucky and Tennessee, and in the Ozark sub-region of southern Missouri, and northern Arkansas, should be noted. (1921 Yearbook, U. S. Dept. of Agr.)

young V-shaped valleys, especially near the Blue Ridge (Fig. 80). A rolling relief characterizes also the long, narrow limestone valleys that lie between the Blue Ridge on the southeast and the Appalachian and Cumberland Plateaus on the northwest (Fig. 81). The Blue-grass districts of Kentucky and Tennessee, which are eroded-dome, limestone basins, likewise have a rolling surface (Fig. 82). The Appalachian Ridges and Ozark Plateau portions of the region, on the other hand, are hilly (Fig. 83); also parts of the "Highland Rim" area lying between, while the prairies of eastern Kansas are mostly level. In the Flint Hills sub-region of Kansas much of the soil is too shallow to plow.

The highest altitude in the eastern United States (6,711 feet) is attained by Mt. Mitchell, in western North Carolina, in the Blue Ridge portion of the Belt, while altitudes of 3,000 feet are reached

by many of the ridges in southwestern Virginia and eastern Kentucky. However, most of the agricultural land east of the Mississippi River lies below 1,000 feet elevation. The hilly Ozark Plateau has an elevation mostly between 1,000 and 2,000 feet. West of the Ozarks lies the prairie portion of the Belt, which attains an elevation of 1,600 feet in the Flint Hills of Kansas.

Soils

The soils of the Belt, like the topography, are very diverse (Fig. 6).³ On the Upper Coastal Plain the soils are mostly yellowish loams and clay loams, and as the surface is level to rolling, it is mostly available for crops. But the soils, in general, are of low to medium fertility and are extensively fertilized

³ ECONOMIC GEOGRAPHY, October, 1926, issue; *Agricultural Regions of North America*, Part I, by the author.

(Fig. 61).⁴ The Piedmont soils are reddish sandy and clay loams of about average fertility, and less fertilizer is used. In the Appalachian Mountains the broad rolling valleys contain mostly reddish and often shallow, but fertile silty, limestone soils; whereas the ridges, usually steeply rolling and clothed mostly with forest, have a thin covering of yellowish sandy or stony soils, commonly of low fertility. The Highland Rim sub-region, west of the mountains, has soils of medium fertility, but the Kentucky Blue-grass and Nashville Basins within this rim are very fertile districts of limestone soils. The Ozark sub-region is a dissected plateau having much rough land, and poor to medium, often stony, soils. Along its northern and western margin limestone outcrops and the land is much richer. The prairies of western Missouri and eastern Kansas are mostly level to rolling and the dark colored soil is fair to good, except where a hardpan has developed. The Flint Hills along the western margin of the region is a district of thin, mostly limestone, soils.

UTILIZATION OF THE LAND

Because so much of the Belt is mountainous or hilly, only 32 per cent of the land area, or 53,000,000 acres, was in crops in 1919 (Fig. 84), and about 18 per cent (30,000,000 acres) was used exclusively for pasture, while over 40 per cent (70,000,000 acres) was forest or cut-over land (Fig. 10).⁵ Over 85 per cent of the Belt was originally forested. Fully half of this forest land, therefore, has been cleared for agricultural use, and one-third of the remaining forest and cut-over land might be cleared and used for crops when the price of agricultural products justifies the cost of clearing. At present in the mountain districts about 75 per cent of the area is forest or cut-over land (and more should be), 15 to 20 per cent is in

⁴ ECONOMIC GEOGRAPHY, January, 1927, issue; *Agricultural Regions of North America*, Part II, by the author.

⁵ ECONOMIC GEOGRAPHY, October, 1926, issue; *Agricultural Regions of North America*, Part I, by the author.

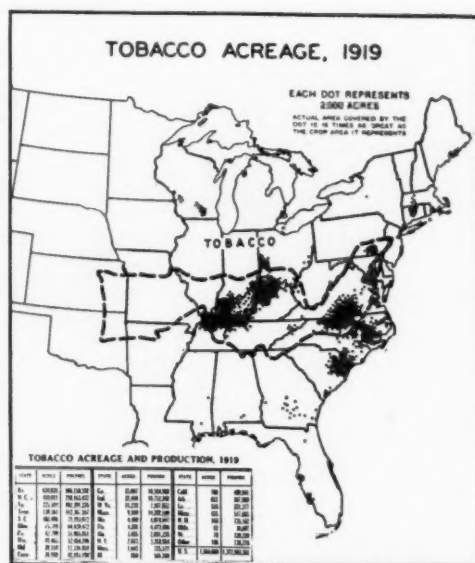


FIGURE 85.—Over 70 per cent of the tobacco acreage in the United States is found in the Corn and Winter Wheat Belt, principally in the Bluegrass and Highland Rim sub-regions of Kentucky and adjacent portion of Tennessee, on the Piedmont of Virginia and North Carolina, in the Upper Coastal Plain in Maryland, and in Lancaster County, on the Piedmont, in Pennsylvania. (Adapted from map, 1921 Yearbook, U. S. Dept. of Agr.)

crops, and most of the remainder is used for pasture (see Table I). In the Coastal Plain, the Piedmont, the Appalachian Valleys and the Blue-grass Basins, the proportion of the land in crops rises to 25 and 30 per cent; while in the prairie portions, which include most of eastern Kansas and adjoining parts of Missouri and Oklahoma, about 40 per cent of the land area was in crops in 1919 and most of the remainder in pasture. Much of this pasture can be used for crops when the need arises.

The Crops

Because of these varied topographic conditions the agriculture of the Belt is more diversified than that of the Corn Belt to the north and the Cotton Belt to the south. Corn, wheat, and hay are very important crops in almost every county in the Belt. Corn is not produced in such quantities as in the Corn Belt (Fig. 12),⁶ and in many counties,

⁶ *Ibid.*

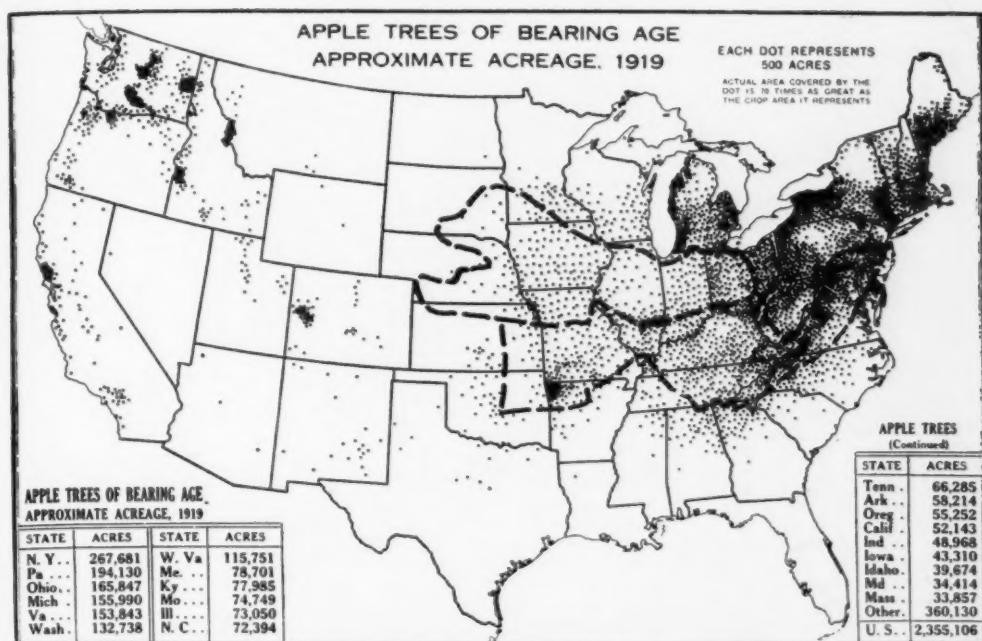


FIGURE 86.—The Corn and Winter Wheat Belt contains several of the most noted apple districts in the United States. The districts scattered along the Shenandoah Valley and Great Valley, from Pennsylvania to North Carolina, and on the slopes of the Blue Ridge to the east, stand out on the map; also the Ozark district in northwestern Arkansas and southern Missouri. These areas of hilly land are better adapted to fruit than to the staple crops. The relatively few apple trees in the Corn Belt to the northwest will be noted. (1921 Yearbook, U. S. Dept. of Agr.)

especially in Maryland, in southern Illinois, and in southeastern Kansas, winter wheat was a more important crop than corn in 1919 (Fig. 14);⁷ while in the Upper Coastal Plain and Piedmont portions, also in the Blue-grass and Highland Rim sub-regions, there are several counties in which the value of the tobacco is far greater than that of corn and almost no wheat is grown (Fig. 85). Similarly in several Coastal Plain and mountain counties fruit is the crop of greatest value. The fruits are principally apples, peaches, and small fruits (Figs. 86, 87, and 88).

In 1919 corn occupied nearly one-third of the crop land in the region as a whole, wheat nearly one-fourth, hay nearly one-fifth, and tobacco one-fiftieth (see Table I). In value corn ranked first, constituting 35 per cent of the value of all crops, while wheat contributed nearly 19 per cent, hay nearly 13 per cent, and tobacco 12 per cent. Fruits, potatoes,

⁷ *Ibid.*

and vegetables jointly contributed nearly 14 per cent. These eight crops, or groups of crops, comprised 94 per cent of the acreage and 96 per cent of the value of all crops.

Corn is grown everywhere, on rich soils and poor, on hill slopes and in the valley bottoms. In the mountains of Kentucky and Tennessee little else is grown except a garden containing beans, potatoes, and other vegetables, and a patch of sweet sorghum for syrup. In the areas of less hilly surface and more fertile soils wheat becomes, in general, as important as corn, and in the western prairie portion of the Belt it becomes in years of high prices the dominant crop, constituting in eastern Kansas normally over a third of the acreage of all crops. Hay is grown almost as widely as corn, but is more important in the northern portion than in the southern, notably in the Piedmont of Pennsylvania, in the Ohio and Wabash Valleys, and in eastern Kansas. The

TABLE I
PHYSIOGRAPHIC SUB-REGIONS OF THE CORN AND WINTER WHEAT BELT
Value of Farm Land, Land Utilization, Relative Importance of the Crops, and Value of Crops per Acre of the Total Land Area

Sub-region	Value of Farm Land (Only) Per Acre 1925	Per Cent of Total Land Area in—		Per Cent of Value of All Crops in 1919 ^a Contributed by—							Value of Crops, 1919, Per Acre of Total Land Area
		Crops, 1919 ^b	Pasture, 1924	Forest and Brush, 1919 ^c	Corn	Wheat	Oats	Hay	Potatoes, Fruit	Tobacco	
Upper Coastal Plain (level sands to rolling clay lands) . .	\$36	29.4	9.7	45.4	33.4	16.0	0.3	11.6	25.9	10.5	\$12
Piedmont Low Plateau (rolling upland with V-shaped valleys)	36	30.9	11.0	47.4	31.0	12.5	1.7	10.9	17.2	24.5	16
Blue Ridge (a mountainous country)	33	17.0	14.9	66.1	46.1	10.4	1.5	14.3	20.8	1.8	6
Appalachian Valley (limestone valleys with slate ridges) . .	44	30.6	18.7	45.5	41.4	16.6	1.6	16.0	20.0	1.5	13
Cumberland Plateau (nearly level sandstone deeply dissected by streams)	18	14.3	8.9	71.6	51.3	1.7	1.3	8.9	25.0	1.3	5
Lower Ohio Valley and Highland Rim (a rolling to hilly area)	26	32.8	19.0	38.4	41.8	9.7	1.1	11.1	9.0	24.3	14
Limestone Basins (rolling blue-grass country)	51	35.4	37.3	22.6	39.7	7.4	1.0	12.1	8.1	26.8	18
Southern Illinois Country (level upland, locally much dissected)	42	47.9	19.6	21.2	37.7	18.8	7.5	19.6	10.3	0.1	13
Missouri and Wabash Valleys (rolling, with some level river bottoms)	47	46.7	13.4	32.3	31.1	37.9	4.3	12.3	12.4	0.05	15
Ozark Plateau (forested) (a dome, deeply dissected on margins)	18	17.9	9.6	68.7	32.9	13.3	3.3	19.0	23.1	0.2	5
Ozark Prairie Border (rolling to broken limestone area)	32	33.9	16.8	45.2	28.1	27.4	8.3	13.1	20.8	0.05	10
East Kansas Prairie Plains (level to rolling, some hardpan)	59	46.4	27.7	10.3	24.5	41.4	8.9	10.7	7.2	0.02	14
Flint Hills (prairie) (a limestone plateau—shallow stony soils)	37	28.1	37.3	4.9	17.4	35.3	6.8	24.5	4.5	0	7
Average for entire region	\$37	31.7	18.0	41.7	35.1	18.7	3.2	12.7	13.7	12.4	\$12

^a The 1924 Census did not include all the crops, so it seemed better to use the 1919 figure. The decrease in crop acreage between 1919 and 1924 was probably about 5 per cent. Part of this former crop land is lying idle, part is used for pasture.

^c Estimates for forest, cut-over and brush land outside farms are available for 1919 only.

southern boundary of this Corn and Winter Wheat Belt marks the southern limit of timothy, and to a large extent of red and alsike clover also, while some of the southern hay crops, notably cowpeas, extend across the Belt nearly to the northern border. In eastern Kansas and northwestern Oklahoma alfalfa and wild hay replace timothy and clover.

The more intensively cultivated crops—tobacco, potatoes, sweet potatoes, vegetables, and fruits—are not of widespread importance, like the corn, wheat, and hay, but become dominant locally. Potatoes, vegetables, and fruits constitute one-fourth of the value of all crops in the Upper Coastal Plain sub-region

and one-fifth in the hilly Blue Ridge sub-region, in the Appalachian Valley, in the Ozark Plateau and Ozark Border sub-regions. Although occupying a smaller acreage, the fruits and vegetables possess jointly a greater value than wheat in the Upper Coastal Plain, the Piedmont, Blue Ridge, Appalachian Valley, Cumberland Plateau, Limestone Basins, and Ozark Plateau divisions. Tobacco contributes a fourth of the value of all crops, exceeding wheat in value, in the Piedmont, in the Highland Rim, and in the Limestone Basin sub-regions.

The influence of topographic conditions, and to a less extent of soils, upon the value and utilization of the land and

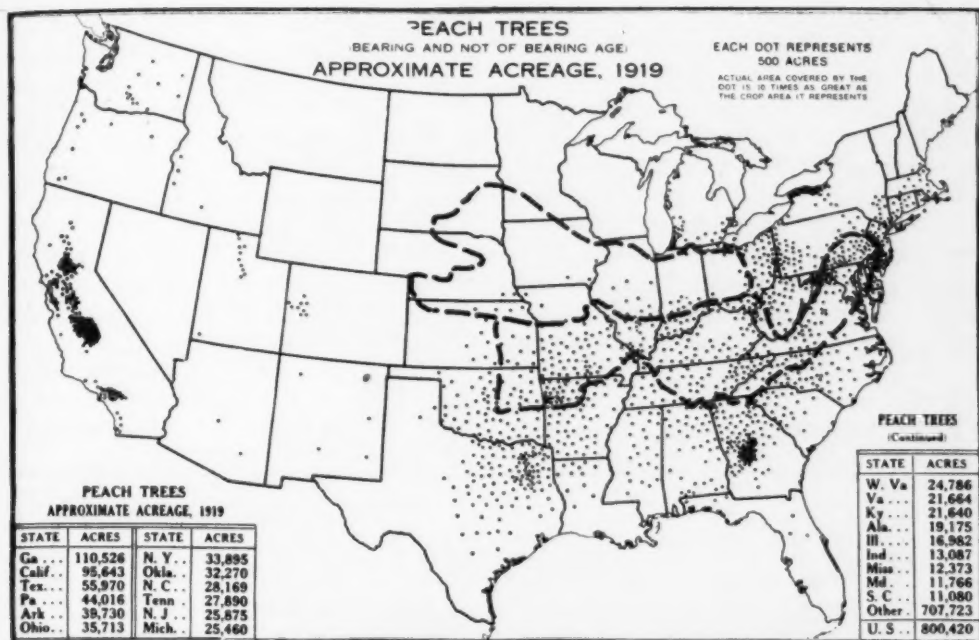


FIGURE 87.—The production of peaches, largely for home use or local consumption, is common throughout the Corn and Winter Wheat Belt. However two commercial districts of considerable importance are located within the Belt; the southeastern Pennsylvania district, and the Ozark district in Arkansas. Very few trees, it will be noted, are found in the Corn Belt to the northwest, owing to the colder winters and more fertile soils which favor general farming. (1921 Yearbook, U. S. Dept. of Agr.)

the relative importance of the crops can be seen in Table I. Corn is dominant in the hilly areas and wheat on the more level lands. The fruits and vegetables, like the corn, are of greatest relative importance in the hilly regions. These are intensively cultivated crops less adapted than wheat to the use of planting and harvesting machinery, and the higher value of the product per acre permits the greater use of fertilizer.

Pasture

The acreage of plowable pasture in the Belt is greater than that of corn, while the acreage of non-plowable pasture (excluding woodland pasture) is almost equal to that of wheat. The plowable pasture is found largely in the valleys of Virginia and Tennessee, in the Blue-grass district of Kentucky, and in eastern Kansas and western Missouri (Fig. 89), while the non-plowable pasture is most important in the Flint Hills of Kansas

and along the northern margin of the Ozarks (Fig. 90). Most of the pasture in the eastern and central portions of the Belt is permanent blue-grass pasture, although timothy, redtop, and orchard grass are locally important pasture plants. In the southeastern Kansas and Oklahoma portion the pasture is composed almost wholly of the wild grasses, blue-stems mostly. The Flint Hills, which extend almost across eastern Kansas, are largely devoted to pasture.

The pasture lands of the Corn and Winter Wheat Belt probably contribute about as much as the corn crop to the sustenance of the livestock, and provide a very large proportion of the summer feed. The carrying capacity is, in general, from 2 to 4 acres per cow or steer, but in the rich blue-grass basins it is less than 2 acres, while in the Flint Hills of Kansas and in portions of West Virginia it falls to 5 acres per head.

Livestock and Dairying

The Corn and Winter Wheat Belt contained on January 1, 1920, about 12½ million animal units, an average of 48 per square mile, or about 10 per farm. This is half the density in the Corn Belt and less than half as many per farm, but both density and number per farm are 40 per cent greater than in the Cotton Belt. Dairy cattle constituted 29 per cent of the total animal units, beef cattle 22 per cent, horses and mules 30 per cent, swine 10 per cent, poultry 6 per cent, and sheep and goats 3 per cent.

Outside these centers of production for urban use, the cows are kept mainly to provide milk and butter for use on the farm. Most of the butter is still made on farms in this region, perhaps a larger proportion than in any other major agricultural region (Fig. 92).

Beef cattle are most numerous in eastern Kansas and Oklahoma and in western Missouri—the prairie portion of the belt—and on the pastures of the Blue-grass Basin of Kentucky and of the limestone valleys of Virginia (Fig. 24).¹⁰ There are very few on the Piedmont and Coastal Plain divisions. The produc-

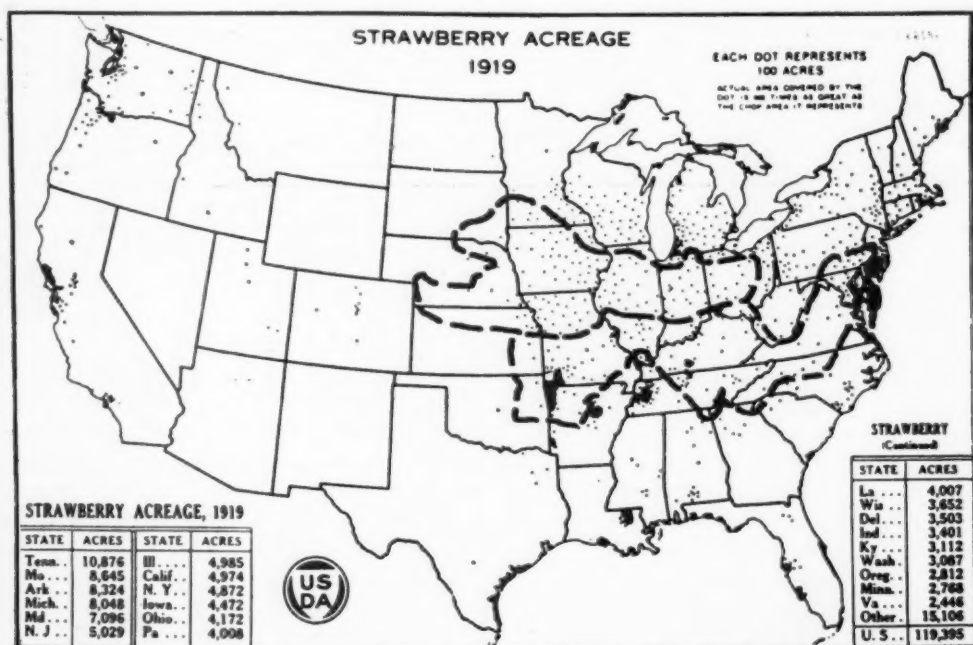


FIGURE 88.—Strawberries and the other small fruits, except cranberries, are grown throughout the Corn and Winter Wheat Belt, but only in the Ozark, the Highland Rim, and the Upper Coastal Plain sub-regions does the small fruit crop become of great commercial importance. (1921 Yearbook, U. S. Dept. of Agr.)

However, the value of the pork and lard produced annually exceeds that of dairy products, and is much greater than that of the beef produced.

Dairying is especially important in southeastern Pennsylvania, and northern Maryland, where Philadelphia, Baltimore, and Washington afford good markets for milk, and around Cincinnati, St. Louis, and Kansas City (Fig. 91).

tion of hogs is densest in central Tennessee and the Ohio Valley, where the production of corn is also greatest. (Compare Figs. 12 and 21.)¹¹ Poultry production is particularly heavy in southeastern Pennsylvania and southern Illinois (Fig. 93). The region includes,

¹⁰ ECONOMIC GEOGRAPHY, October, 1926, issue; *Agricultural Regions of North America*, Part I, by the author.

¹¹ *Ibid.*

in the Southern Appalachian section, the greatest center of honey production in the United States (Fig. 94).

The Corn and Winter Wheat Belt, apparently, does not produce quite enough livestock to meet its own needs, except of poultry, of mules, and of carriage and saddle horses. The production of driving horses in the United States, now of small significance, is practically confined to Kentucky and Virginia (Fig.

tion as the average for the United States, and about five-sixths as great quantity of hogs. This latter figure applies also to dairy products. The region produces a surplus of poultry and eggs about one-fourth in excess of its needs.

About 72 per cent of the crop land in the region in 1919 produced feed for farm animals and 25 per cent food for man, wheat being the most important food crop. Only 3 per cent of the crop

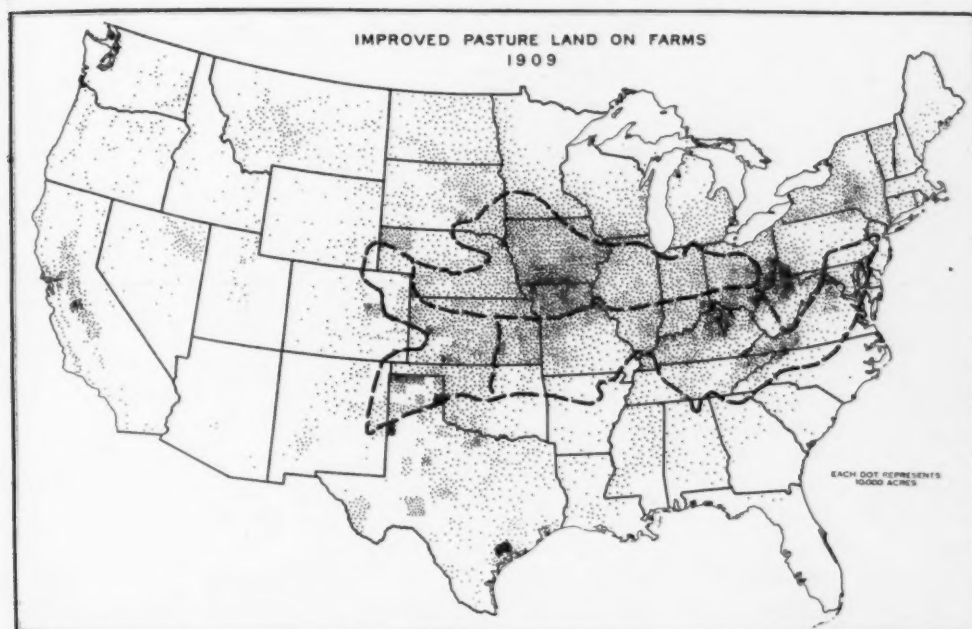


FIGURE 89.—Improved pastures are very important in the Corn and Winter Wheat Belt, especially in the Bluegrass district in Kentucky, the limestone valleys of southwestern Virginia and eastern Tennessee, and in the prairie sub-regions of western Missouri and eastern Kansas. The map shows fully as dense acreage of improved pasture in the western Corn Belt, but very little in the Cotton Belt to the south. Statistics of pasture have just become available for 1924, but shortness of time has not permitted the preparation of a new map. (1921 Yearbook, U. S. Dept. of Agr.)

95). The mules are raised principally in Missouri, Kansas, the lower Ohio Valley and Tennessee, and a large surplus is shipped to the Cotton Belt (Fig. 96).

Although beef production is important in the western portion of the Belt and in the Appalachian Valley, and hogs are especially numerous in southern Indiana and central Tennessee, the belt produces only about two-thirds as great quantity of beef as would be required if the population had the same per capita consump-

tion as the average for the United States, and about five-sixths as great quantity of hogs. This latter figure applies also to dairy products. The region produces a surplus of poultry and eggs about one-fourth in excess of its needs.

SYSTEMS OF FARMING

The common systems of farming in the region are based on corn, wheat, hay, and livestock, dairying being dominant near the cities, beef production where there is abundant pasture, hogs where there is a large production of corn, and wheat on the level lands. Nearly all the corn and hay is fed to livestock, and the wheat is sold, contributing about 16 per cent to

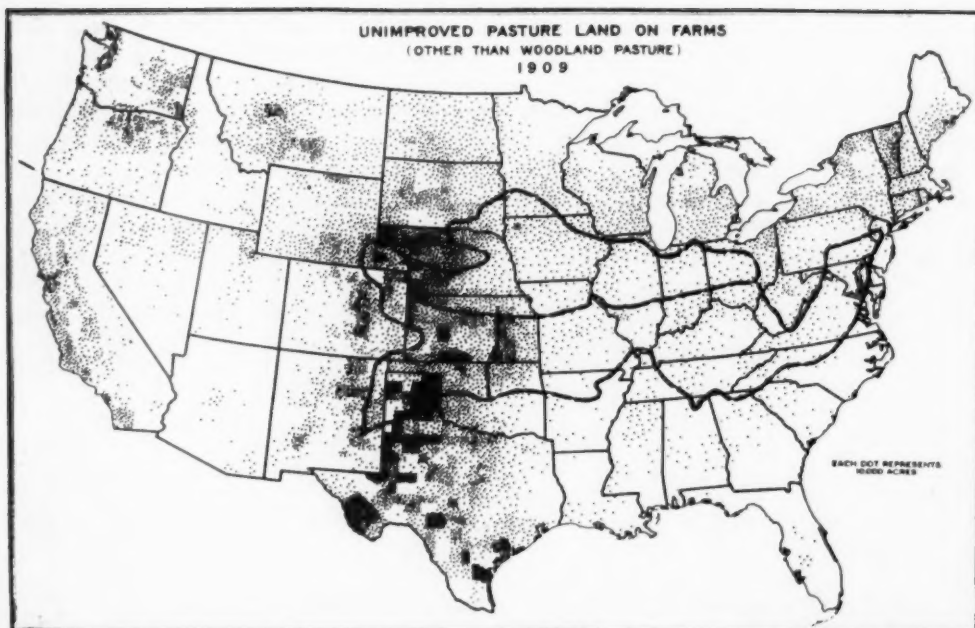


FIGURE 90.—Unimproved pasture is much more extensive in the Hard Winter Wheat Region than in the Corn and Winter Wheat Belt. However, a large acreage will be noted in the Flint Hills sub-region of Kansas. (From 1921 Yearbook, U. S. Dept. of Agr.)

the gross income of the farmers of the region in 1919.

The common rotation is corn one or two years, wheat one or two years, hay one or two years, often followed by pasture. In the mountains of Kentucky, as already noted, corn may follow corn for many years, and in eastern Kansas wheat often follows wheat, but outside these areas the usual rotation is some combination of corn, wheat and hay. In this respect the region resembles much of the Corn Belt, except that, in general, corn is slightly less and wheat slightly more important, and the production of corn per square mile is smaller.

Special Enterprises

In addition to the systems of general farming, including dairying, based on corn, wheat, and hay, there are three specialized enterprises in the region based on the special requirements, particularly for labor, of three crops or groups of crops—tobacco, fruits, and vegetables. These greatly alter locally the general system of farming, and in

some districts become sufficiently independent to be called separate systems of farming.

About 70 per cent of the tobacco produced in the United States is grown in this region, or nearly as much as in all the world outside the United States. The principal centers of production are in western Kentucky and adjacent counties in Tennessee, in the Blue-grass district of Kentucky, in the Piedmont of North Carolina and Virginia, in the Coastal Plain portion of Maryland west of Chesapeake Bay, and in Lancaster County, Pennsylvania (Fig. 85). In most counties in these areas tobacco is the leading crop in value, and in some counties has a greater value than all other crops combined. In Pennsylvania the tobacco is usually grown in rotation with corn, wheat, and clover; but in Maryland and North Carolina successive crops of tobacco are planted for several years and then a period of rest is the practice commonly followed. In Kentucky the tobacco is grown, whenever possible, on freshly broken sod, partly as a precaution

against disease. Owing to the large amount of labor required, the average area of tobacco per farm in these districts is only 4 to 6 acres. Tobacco is commonly grown as a special enterprise on a farm following the general system of farming just described (Fig. 97).

Fruit, likewise, is locally important in this Corn and Winter Wheat Belt, especially on the foothills of the Appalachian Mountains, in the Ohio Valley, and in the Ozarks of southern Missouri and northwestern Arkansas (Fig. 86).

production of peaches, except near the Great Lakes (see Fig. 87). The strawberries and bush fruits, on the other hand, especially in the Coastal Plain portion, are commonly grown by farmers who also grow truck crops.

Vegetables grown for market are important in the Coastal Plain portion of this region. Smaller centers of vegetable production are located around Cincinnati, Louisville, St. Louis, and Kansas City. Truck growing is usually a specialized type of farming, involving, like



FIGURE 91.—The afternoon siesta in a Piedmont pasture. Note the stones in the foreground which would interfere with the use of the land for crops. The creek indicates that the land may be subject to overflow. Such land is commonly used for pasture. Photo by R. R. Ruark taken in Chester County, Pennsylvania, where some of the most productive pastures in the United States are found.

About one-fourth of the total fruit acreage in the United States is in this region. The commercial crop of apples is grown largely by men who grow little else; that is, it is an independent system of farming, highly specialized and requiring unusual skill and intelligence. The same is true of peaches, which are, however, much less important. From Ohio westward, the winters are too cold north of the Belt for the commercial

tobacco and fruit, the intensive cultivation of small parcels of land. The cropping systems in the trucking districts are very variable. In general, one crop of potatoes or vegetables is grown after another, sometimes several in the same year, the fertility of the land being maintained by heavy applications of manure and commercial fertilizer. Some truck growers, on the other hand, grow vegetables in rotation with the ordinary farm

crops, commonly wheat, corn or rye, and hay.

But probably more important than the commercial truck growing in the region is the production of vegetables for home use, whose value is exceeded only by those so grown in the Cotton Belt. In Southeastern Pennsylvania and in the mountains of Kentucky and Tennessee

items total \$1,900,000,000, and give an average gross income of nearly \$1,500 per farm. Out of this amount the expenses of production had to be met. About 47 per cent of the income came from sale of crops and 53 per cent from livestock. Nearly all the corn, valued at nearly 800 million dollars, all the oats, valued at 87 million, and hay, valued at

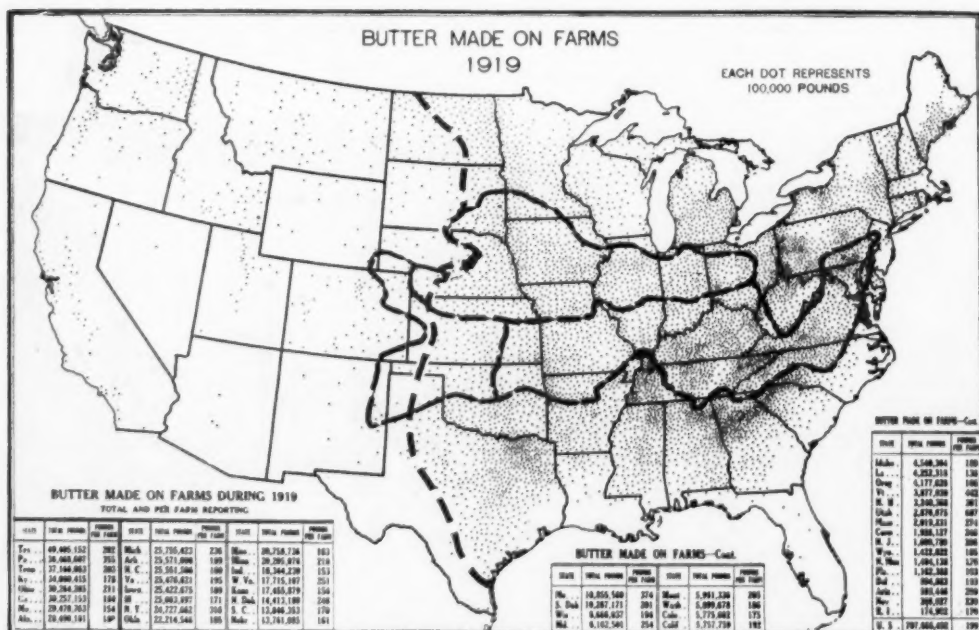


FIGURE 92.—Most of the butter produced in the Corn and Winter Wheat Belt is still made on farms. Particularly dense is the farm butter production in the mountains of southwestern Virginia and eastern Tennessee, and on the adjacent Piedmont. Much less butter is made on the larger farms in the western portion of the Belt. Most of this farm-made butter is consumed locally, the commercial production being found principally in the Hay and Pasture Region and the Corn Belt to the north. Note how little butter is made on farms in the Hard Winter Wheat Region, and the less humid western half of the United States. (1921 Yearbook, U. S. Dept. of Agr.)

the production of vegetables for home use is especially dense (Fig. 98).

Relative Importance of the Farm Enterprises

The gross income to the farmers of the region from the principal farm enterprises may be estimated for 1919 as follows: wheat 368 million dollars, tobacco 253, vegetables 105, fruit 90, potatoes 85, and other crops not fed to livestock 116 million; hogs 340 million dollars, poultry and eggs 300, dairy products 250, beef cattle 100, mutton and wool 20. These

300 million, were fed to livestock, including horses and mules.

Sizes of Farms

The farms in the region averaged nearly \$8,000 in value and nearly 100 acres in area in 1919, of which 40 acres were in crops, about 23 acres in pasture, and 30 acres in woodland. The remaining 5 acres included farmsteads, roads, lanes, and idle or waste land. There were about 5 acres more crops per farm in 1919 than in 1909, $3\frac{1}{2}$ acres less pasture, $1\frac{1}{2}$ acres less woodland. But by 1924 over

5 acres of the crop land were lying idle, the average acres of harvested crops per farm being the same as in 1909, and the average value of the farms had shrunk to about \$6,000. Over one-third of the farms are under 50 acres in area, one-half are between 50 and 175 acres, and less than one-sixth are over 175 acres.

In the Virginia and Maryland portion of the Belt the farms averaged about \$7,000 in value in 1919 and 100 acres in area, of which about 40 acres were in

county from less than 75 to about 150 acres per farm, and the average value of farms from \$6,000 to \$15,000. The prairies could be plowed up and put into crops quickly in large units, whereas even 50 acres of forest required many years to clear, and meanwhile population increased and likewise the demand for land.

The larger size of farms in the prairie portion of the region is also owing in part to the agriculture being based almost wholly on grain and hay, crops adapted

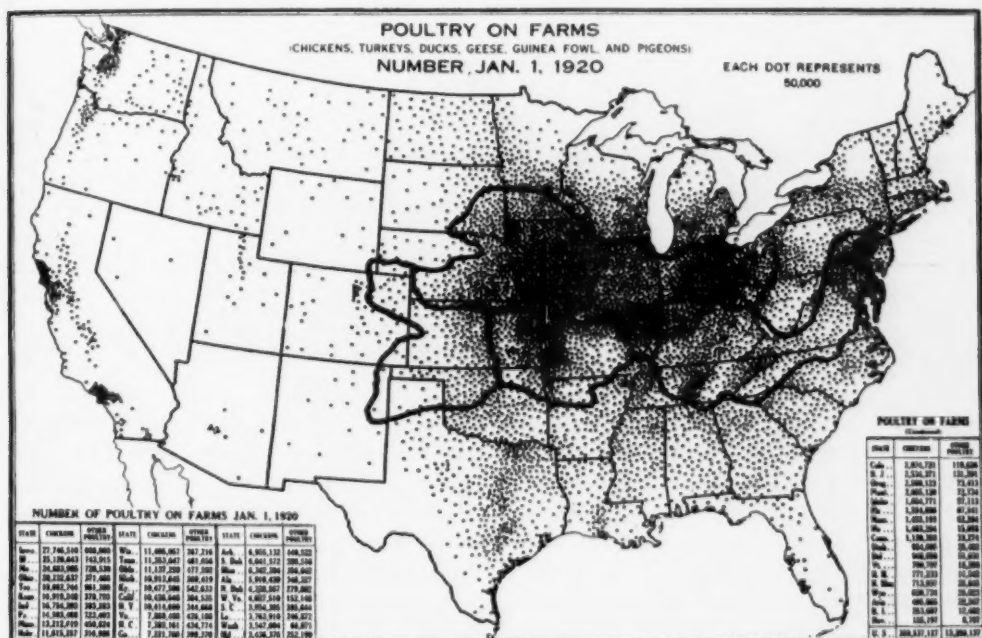


FIGURE 93.—One of the densest poultry and egg producing areas in the United States, the Piedmont of southeastern Pennsylvania, is found within the Corn and Winter Wheat Belt. Other areas of dense production are southwestern Ohio, southern Illinois, eastern Tennessee, and western Missouri; in brief, where corn and wheat are most abundant. But poultry are still more numerous in the very fertile Corn Belt to the North. (1921 Yearbook, U. S. Dept. of Agr.)

crops; in the Kentucky and Tennessee portion the farms averaged \$5,000 in value and 80 acres in area, of which about 30 acres were in crops; while in the prairie portion of western Missouri and eastern Kansas the farms averaged \$15,000 in value and 170 acres in area, of which 85 acres were in crops. A rapid increase in size of farms occurs along the margin of the prairies in Missouri and Oklahoma, the average acreage of improved land increasing usually within the width of a

to extensive cultivation by modern farm machinery. In the originally forested portion of the Belt, on the other hand, there are many tobacco farms on the better soils, fruit farms in the hills, truck farms on the Coastal Plain, and these all require large amounts of labor applied to a small acreage of land.

For the region as a whole the number of farms decreased 1 per cent and the average area per farm decreased, on the average, one and a half acres in area

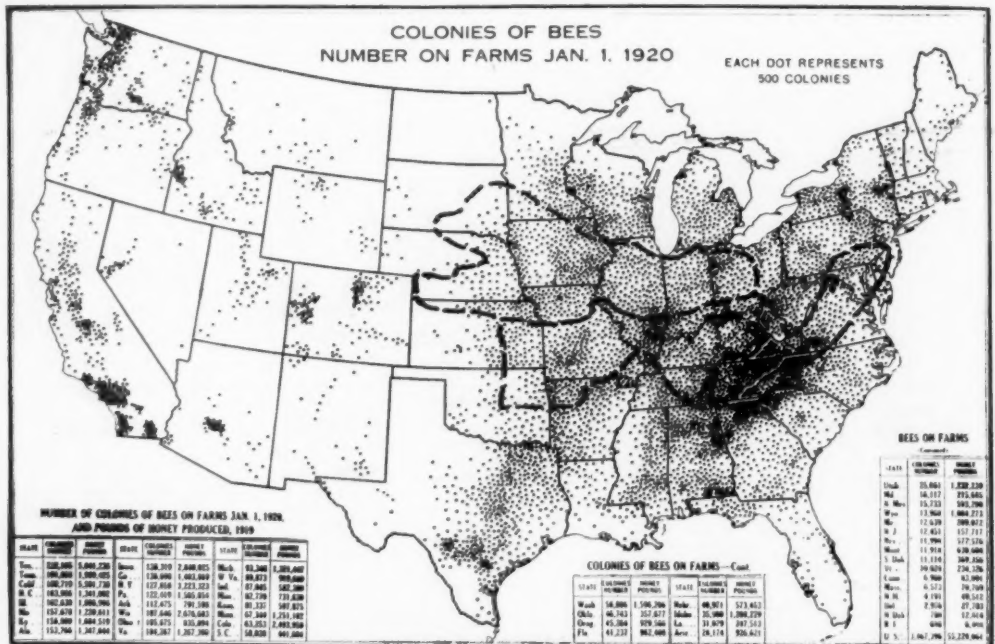


FIGURE 94.—Within the Corn and Winter Wheat Belt more bees are found than in any other agricultural region, the great center being the southern Appalachian Mountain area. The production of honey per colony is much lower, however, than in California, Texas, Colorado, Iowa, and Wisconsin. Each of these states produced more honey in 1919 than any state in the Corn and Winter Wheat Belt. See table in corner of map. (U. S. Dept. of Agr. Yearbook, 1921.)

between 1910 and 1920. But in the eastern forested portion, which is characterized by small farms, the farms decreased, on the average, 5 acres, or about 6 per cent; while in the western prairie portion, where larger farms prevail, the farms increased in size about 8 acres, or 5 per cent. However, the acreage of crops per farm increased in every division of the region, and the proportionate increase was as great in the eastern as in the western divisions. The tendency during the war period to plow up pasture land and put it into crops is shown throughout the region. Since the war most of this additional crop land has been put back into pasture, or allowed to lie idle. But the number of farms has remained practically the same as in 1919.

There are on the average in the Belt as a whole three head of work stock per farm, but in the Cumberland Plateau district there are only one or two per farm, whereas in the eastern Kansas-Oklahoma prairie portion the number rises to 5.

About one-third of the farms have beef cattle, averaging 9 or 10 head of all ages per farm; three-fourths of the farms have dairy cattle, averaging 10 head per farm on January 1, 1919. Over nine-tenths of the farms raise chickens, and the average number on January 1, 1919, was 70 per farm.

LAND TENURE

Nearly 70 per cent of the farms in the Corn and Winter Wheat Belt are operating by the owners, nearly 30 per cent by tenants, and less than 1 per cent by managers. The tenant farms are fairly evenly distributed throughout the region, except that they are much less numerous in the Appalachian and Ozark sub-regions (Fig. 31).¹² In these mountainous districts the farms are generally too small or unproductive to support both a landlord and a tenant. In the Corn and

¹² ECONOMIC GEOGRAPHY, October, 1926, issue; *Agricultural Regions of North America*, Part I, by the author.

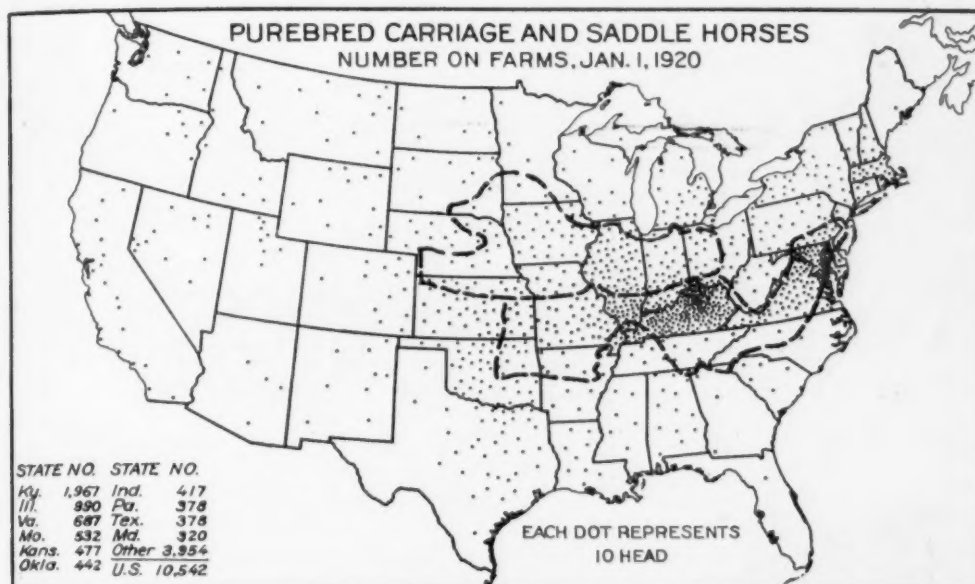


FIGURE 95.—The relatively large number of saddle and carriage horses in Kentucky and adjacent portions of Illinois and Indiana, also in Virginia and Maryland, is noteworthy. These are areas famous in song and story for their fine horses, and despite the decline of horse racing as a sport, and the decreased use of horses for riding and driving, breeders and horse fanciers in these states retain a large number of pure-bred saddle and carriage horses. Probably only a small number, however, are used for breeding. (U. S. Dept. of Agr. Yearbook, 1921.)

Winter Wheat Region, as in most parts of the United States, there is a clearly defined tendency for the percentage of tenancy to be highest on the richest land.

THE PEOPLE

Nearly half (47 per cent) of the people of the Corn and Winter Wheat Belt live outside incorporated places, mostly on farms (see Fig. 34),¹³ and 8 per cent more live in villages of under 2,500 population. Although the region contains many large cities, notably Philadelphia, Baltimore, Washington, Cincinnati, Louisville, St. Louis, and Kansas City (see Fig. 35),¹⁴ it is still dominantly rural in interests.

Race?

South of the Potomac and Ohio Rivers the population is almost purely of American stock, except for a number of

negroes, notably large in Virginia and North Carolina (Fig. 32).¹⁵ Foreign immigrants have been unwilling to accept the subordinate social status more or less implied in manual employment where negroes are numerous. Undoubtedly also the lower wage rates in the southern states have been influential in excluding immigrants.

North of these rivers the principal foreign stock represented in the rural population is the German. Farmers of German origin are concentrated around Baltimore, Cincinnati, and St. Louis, with a scattered distribution across central Missouri and throughout Kansas (Fig. 99). The "Dutch" (Germans) of southeastern Pennsylvania are included by the census with the American stock. Other racial stocks are of little importance, except that there are a few Italians in New Jersey, engaged largely in market gardening, also a somewhat larger number of Irish in the same area. A few English, Scotch, and Russian farmers are found in New Jersey and in Kansas.

¹³ *Ibid.*

¹⁴ *Ibid.*

¹⁵ *Ibid.*

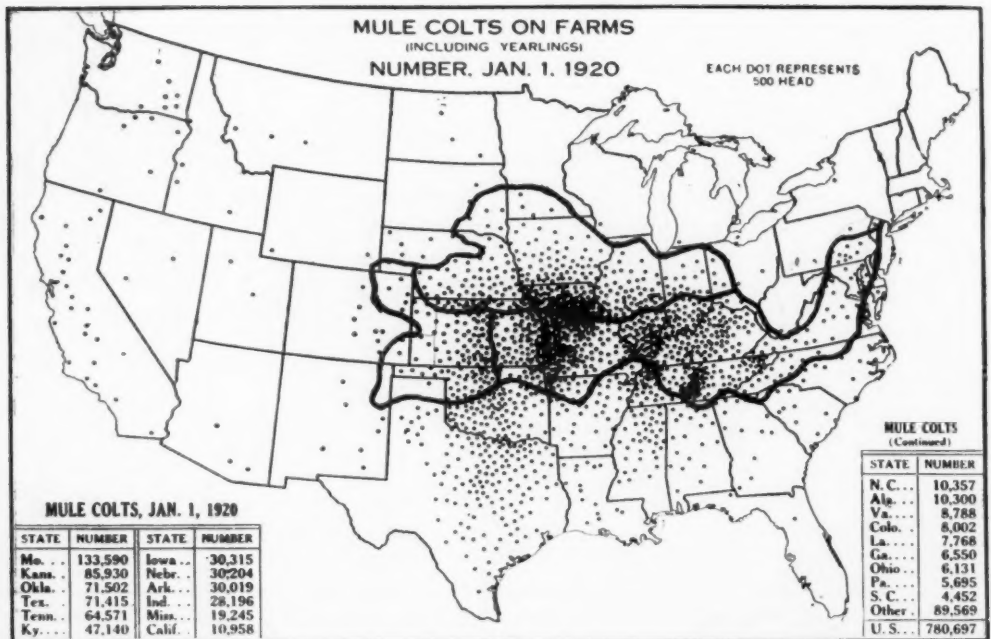


FIGURE 96.—Two-thirds of the mules are raised in the western section of the Corn and Winter Wheat Region and the southern portion of the Corn Belt, the centers of production being about 300 miles south of the centers of horse production. This may be due in part to the adaptation of the mule to warmer temperature than the horse, but also in part to the shorter distance and smaller cost of transportation to the Cotton Belt, where most of the mules are sent. Formerly Kentucky and Tennessee were the leading states in mule production, but now a greater number are raised in Missouri, Kansas, and Oklahoma, where feed is cheaper. (U. S. Dept. of Agr. Yearbook, 1921.)

Religion and Education

In religious affiliation, as in agriculture, the Corn and Winter Wheat Belt is a transition zone between the North and the South. Baptists and Methodists are more numerous than adherents of other denominations, but the influence of emigrants from continental Europe in the northern portion of the belt is shown by a large number of Lutherans, Catholics (Irish and Italians largely, except in Maryland), and Hebrews (living mostly in the cities).

The proportion of the population unable to read or write varies greatly. In the Cumberland Plateau sub-region about 20 per cent of the people over 10 years of age are illiterate, whereas in the eastern Kansas prairie it falls below 2 per cent.

Farms in portions of the Cumberland Mountain district average only 20 acres of crops per farm as compared with 85

in the Kansas prairies. Twenty acres of crops, after providing the bare necessities of life, leave little surplus for education. Schools in these mountain districts are in large part dependent upon outside aid. The innate intelligence of the people is probably as great in these mountain districts as elsewhere, and their passion for education is proverbial. The illiteracy, the highest in the United States, is due to the fact that nature is niggardly and that the people are fecund.

For the Corn and Winter Wheat Region as a whole, the proportion of the rural population illiterate is nearly 7 per cent (5 per cent for white and 20 per cent for negro) as compared with 15 per cent in the Cotton Belt to the south (6 per cent for white and 30 per cent for negro) and $1\frac{1}{2}$ per cent in the Corn Belt to the north (1 per cent for white and 11 per cent for negro).

The Trend in Production and Welfare

The number of farms, the number of people living outside incorporated places, the acreage of farm land and of improved land was almost the same in the region as a whole in 1920 as in 1910, but the acreage of harvested crops increased over 13 per cent during the decade. This indicates an increase in efficiency per person engaged in agriculture of about 12 per cent, which is approximately the same as in the Cotton Belt. This greater effi-

IV HARD WINTER WHEAT REGION

The Hard Winter Wheat Region, like the Corn and Winter Wheat Belt to the east, is a transition area. But the transition is not so much between southern and northern agriculture as it is between the crop farming of the humid East and the grazing of the arid West.

In its essential characteristics the region is northern mingled with western, the only southern influence discernible being along the Cotton Belt margin. The region includes central and western



FIGURE 97.—A tobacco field in North Carolina. Tobacco is a very important crop locally in the Corn and Winter Wheat Belt, notably in portions of Kentucky, North Carolina, Virginia, and Maryland. This belt raises nearly half of the tobacco grown in the world; yet tobacco constituted, in 1919, only 12 per cent of the value of all crops grown in the Corn and Winter Wheat Region. (Photo from U. S. Dept. of Agr.)

ciency in the course of years means increased income, and increased income permits better roads, better schools, and a higher standard of living.

Unfortunately all the gain in crop acreage between 1909 and 1919 the recent census shows was lost between 1919 and 1924; nevertheless, it seems almost certain, as the population of the United States and demand for agricultural products increases, that this loss will be regained within the next decade or two on the farms that remain in operation, and that the general trend of agricultural income in the region is upward.

Kansas (except the northern tier of counties and three counties near the southwestern corner in the arid portion of the Arkansas Valley), northwestern Oklahoma, the northern portion of the Texas Panhandle, much of eastern Colorado outside the dry Arkansas Valley, and several counties in southwestern Nebraska—an area in all of about 72 million acres. It is a small region similar in area to the Humid Subtropical Crops Belt and the Pacific Subtropical Crops Region, but is larger than the Middle Atlantic Trucking Region. The region is not long and

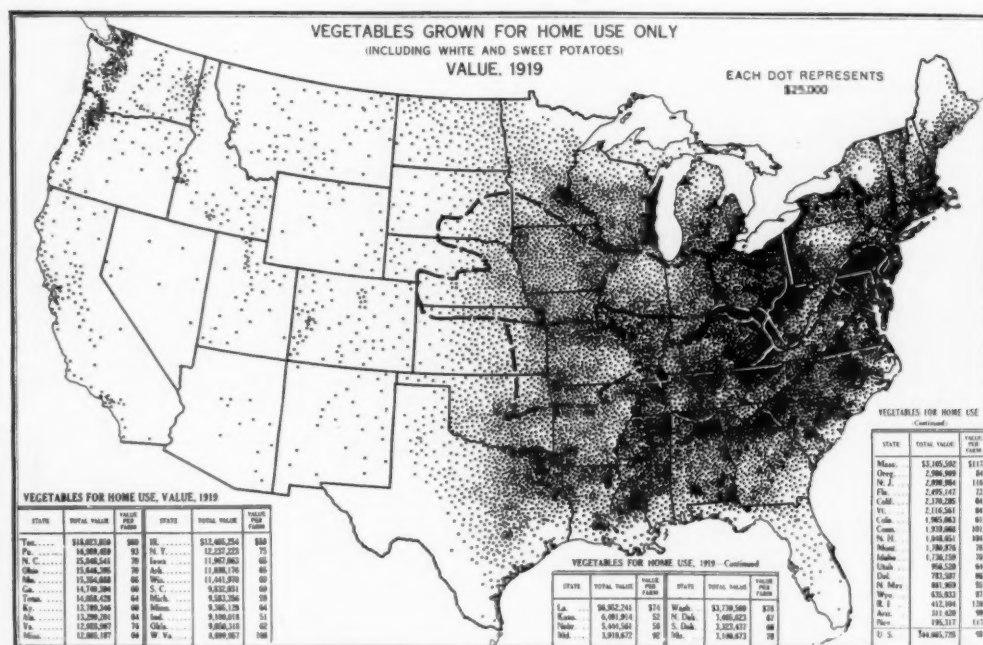


FIGURE. 98—Farm gardens are very important on the Piedmont of southeastern Pennsylvania and Maryland, in the mountains of eastern Kentucky and Tennessee, and in the Ohio valley. Even outside these areas of greatest importance, the value of the vegetables grown for home use in the Corn and Winter Wheat Belt is much greater, it will be noted, than in the Corn Belt. In general, the farm garden is very important in areas of small farms, owned by frugal people, and such are found in most of the Corn and Winter Wheat Belt. (1921 Yearbook, U. S. Dept. of Agr.)

narrow, however, like the agricultural belts previously described, but consists of a major sub-humid eastern portion about 300 miles square, with two semi-arid wings 100 to 150 miles wide extending southwestward and northwestward from 100 to 200 miles (see Fig. 79).

Wheat is the dominant crop in the central portion of the region, where it constituted about 60 per cent of the value of all crops in 1919, but in each of the wings it constituted only about 40 per cent. In the southwestern wing grain sorghums were more important than wheat, contributing about 45 per cent of the value of all crops, but in the northwestern wing wheat is the leading crop, followed by corn, which contributed about 20 per cent of the value of all crops in 1919. In the central portion of the region, although the acreage of pasture is almost equal to that of the crops, its value is probably not one-eighth as much, but in the two wings the acreage

of pasture is three to nine times that of the crops and its value probably fully half as great.

There is no forest in the region, but scrubby brush-land and oak ("shinnery") occurs along the "breaks" in western Oklahoma and the Texas Panhandle, and a few cottonwood and elm trees fringe the rivers. The windbreaks that have been planted on the west side of nearly every farmstead are a characteristic feature of the landscape (Fig. 100).

THE PHYSICAL CONDITIONS

The physical differences within the Hard Winter Wheat Region, unlike those in the Corn and Winter Wheat Belt, are largely climatic.

Boundaries

Three of the four boundaries of the region are solely climatic and the fourth is climatic in part. The southern bound-

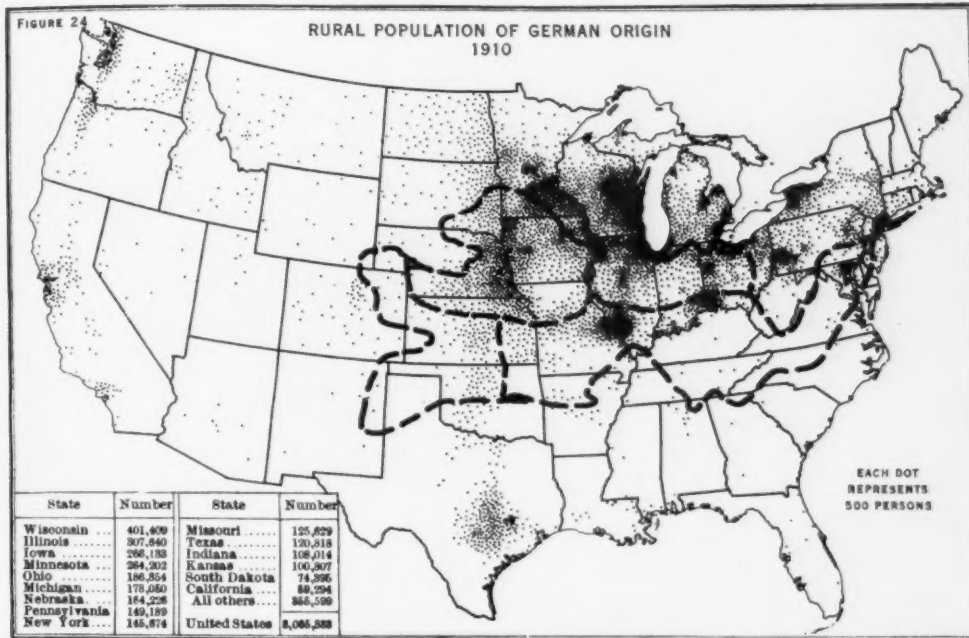


FIGURE 99.—Very few foreign immigrants have settled south of the Potomac and Ohio Rivers, being unwilling to compete with low-priced negro labor, or to accept the inferior social status which manual labor implies to a greater or lesser degree in the South. But north of these rivers, especially around Baltimore, Cincinnati, and St. Louis, large numbers of Germans settled in the quarter century following the Civil War. They and their descendants are among the very best farmers in the Corn and Winter Wheat Belt. The "Dutch" of southeastern Pennsylvania and Maryland have resided in the United States for so many generations that they are classified by the Census with the native Americans. (Rural Population Section, Atlas of American Agriculture, U. S. Dept. of Agr., 1919.)

ary is the northern margin of the Cotton Belt, which follows the summer temperature line of 77 degrees (in the western portion of the Staked Plains as low as 75 degrees). The western boundary is the eastern margin of the Grazing and Irrigated Crops Region, which has been

drawn through those townships where crops occupy one-tenth of the land area; that is, where pasturage normally has a greater value than the crops. The annual precipitation along this line is about 15 inches in southeastern Wyoming and 18 inches in northeastern



FIGURE 100.—This picture was taken in the Corn Belt portion of Nebraska, but it shows the gently rolling surface characteristic of the eastern section of the Hard Winter Wheat Region, and the wind-break of trees, commonly elm, oak, or poplar, planted to protect the farmstead and farm orchard from both the cold, dry, northwest winds of winter and the hot, dry, southwest winds of summer. Note the typically large size of the corn field, which the next year may be in wheat, and the native tall-grass vegetation in the foreground, containing numerous annual flowering plants. (Photo by J. S. Cotton, U. S. Dept. of Agr.)



FIGURE 101.—Seeding wheat in west central Kansas. The vast level areas of the Hard Winter Wheat Region are well adapted to the use of the most modern machinery. In this sub-humid region, the land usually requires plowing each year. After plowing, the land is harrowed, and after harrowing the wheat is sown by drills. The picture shows an eight-foot disk drill, drawn by four horses, and two drills drawn by a tractor. On the large farms of the Hard Winter Wheat Region, a tractor is a useful machine because it saves both labor and time in plowing and in seeding the broad acres to wheat and may be used also in harvesting. (Photo by L. A. Reynoldson, U. S. Dept. of Agr.)

New Mexico. The average summer rainfall line of 7 inches keeps remarkably close to this western boundary of the region.

The northern boundary is drawn where corn replaces wheat as the dominant crop, except that along the North Platte Valley the Sand Hills on the opposite side, with their almost exclusive utilization for grazing and wild hay, form the boundary. This northern, or Corn Belt, boundary appears to be determined by the seasonal rainfall relative to the temperature and the frequency of hot, dry winds. The summer rainfall becomes heavier near the northern boundary of Kansas, and as the temperature becomes cooler also, the evaporation is less, while the hot winds are also less severe; so it has proven possible to grow corn with

success practically every year in the northern tier of counties in Kansas. As corn is a more productive crop than wheat, it has first choice of the land (Fig. 12).¹⁶ Winter wheat is dominant south of this critical line, largely because it grows during the winter and spring and need not survive the summer droughts. Along the eastern boundary, the climate becomes moister rapidly and corn is the dominant crop east of the Flint Hills in many counties in the normal year. Along this eastern margin the average annual precipitation is about 32 inches. The rougher surface and shallow soils of the Flint Hills also interfere with the production of wheat.

¹⁶ ECONOMIC GEOGRAPHY, October, 1926, issue; *Agricultural Regions of North America*, Part I, by the author.



FIGURE 102.—This picture was not taken in the Hard Winter Wheat Region, but probably in the Corn and Winter Wheat Belt, judging by the architecture of the house on the right; yet the picture serves to illustrate the progress that has been made in harvesting wheat. First came the sickle which remained the only implement used for harvesting wheat till about a century ago. With it, a man could cut about an acre a day. Then a cradle was attached to the scythe, and a man was able to cut three acres a day. Soon afterward the first crude reaper was invented. Later came the binder, and then the big combine, of which the use was restricted to the large ranches of the West. It cut, threshed, and sacked 25 to 60 acres of wheat a day, but required four men or more to operate it. Recently the small combine has been developed. See Figure 103. (Photo from U. S. Dept. of Agr.)

Climate

The average annual rainfall of the Hard Winter Wheat Belt ranges from 15 inches in the northwest to 35 inches in

the southeast corner (Fig. 3),¹⁷ the frost-free season from about 200 days along the southern boundary to 130 days in the northwestern corner (Fig. 4)¹⁸; while



FIGURE 103.—The harvesting of the small grains in the Hard Winter Wheat Region is being revolutionized by the small combine. Thousands of machines, similar to that shown above, are now harvesting the wheat so rapidly that the railroads cannot move cars fast enough to carry it away. These small combines, that require only two men to operate them and a third to haul away the wheat, cut and thresh from 25 to 40 acres of wheat a day. Owing to the large cost of the machine, combines are more economical than binders only on farms having over 100 acres of grain, but for farms having 300 acres the cost of harvesting is cut in half by the combine. (Photo taken near Akron, Colorado, by F. A. Coffman, U. S. Dept. of Agr.)

¹⁷ *Ibid.*

¹⁸ *Ibid.*

the summer (June, July, and August) temperature ranges from 77° along the Cotton Belt border to 67° in the northwest corner. Temperature and length of season are sufficient for the production of any of the staple crops except cotton, but the low rainfall, combined with the hot winds, retards the growth of those crops that must survive the summer so seriously that commercial production often becomes unprofitable. Wheat,

the Plains even across to the Rocky Mountains (Fig. 14).¹⁹

Surface of the Land or Topography

The land in this Hard Winter Wheat Region is mostly level to rolling, but along the eastern face of the Staked Plains in the Panhandles of Texas and Oklahoma, and up both the South and North Canadian rivers, the land is rough—known locally as “The Breaks.”

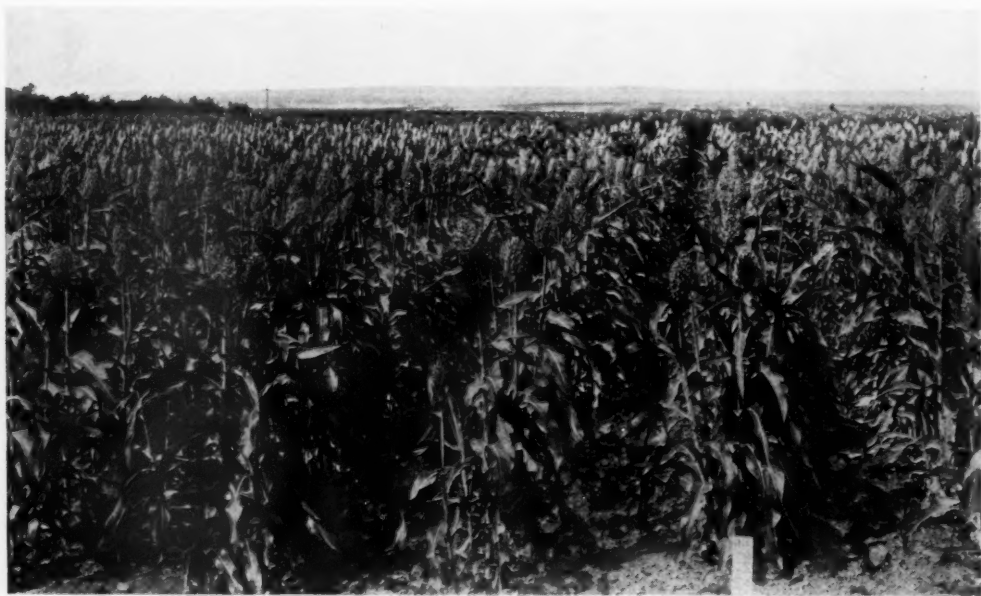


FIGURE 104.—Feterita, a grain sorghum, at the Hays, Kansas, Experiment Farm. The grain sorghums, introduced mostly from Africa during the past half century, are more drought resistant than other crops, and constitute the most important crop in the southwestern section of the Hard Winter Wheat Region. The sorghums are grown, however, throughout the region. (Photo by A. F. Swanson, U. S. Dept. of Agr.)

therefore, is the dominant crop in most of the Hard Winter Wheat Region by default of the other crops, because of climatic conditions. But along the western boundary it defaults in turn to pasture. Wheat extends beyond all the boundaries of the region. Northward it is an important crop half-way across the Corn Belt, eastward it is grown almost to the Atlantic Ocean, southward it is produced rather extensively half way across the Cotton Belt, and westward a few acres are found in the moister spots on

This escarpment belt bordering the High Plains extends into southern Kansas, where it swings toward the east and disappears. Smaller “breaks” border many of the streams in central and northern Kansas. However, this rough land relative to the total area of the region is small in extent, and probably 90 per cent of the land is sufficiently smooth for the use of the most efficient machinery in crop production.

¹⁹ *Ibid.*

Soils

The soils of this region are mostly fertile, chestnut brown to chocolate brown silt loams becoming almost black in places along the eastern margin of the region, with a heavier silty to clayey sub-soil having the characteristic columnar cleavage, except in the sub-humid eastern portion. Beneath this heavy sub-soil a lighter colored limey layer is found at a depth of 15 to 18 inches at the western margin of the region, which descends

and Colorado section, where, as in the Texas portion, there are large areas of sandy to loamy land. These sandy loam soils, however, are probably as well adapted to crop production in the semi-arid section of the region as the more fertile silty soils, because they absorb the rains and then give up the water to crops more readily. Nearly 10 per cent of the land in the Kansas portion and fully 20 per cent in the Texas portion are either too rough for crop production or else so sandy as to be subject to disastrous

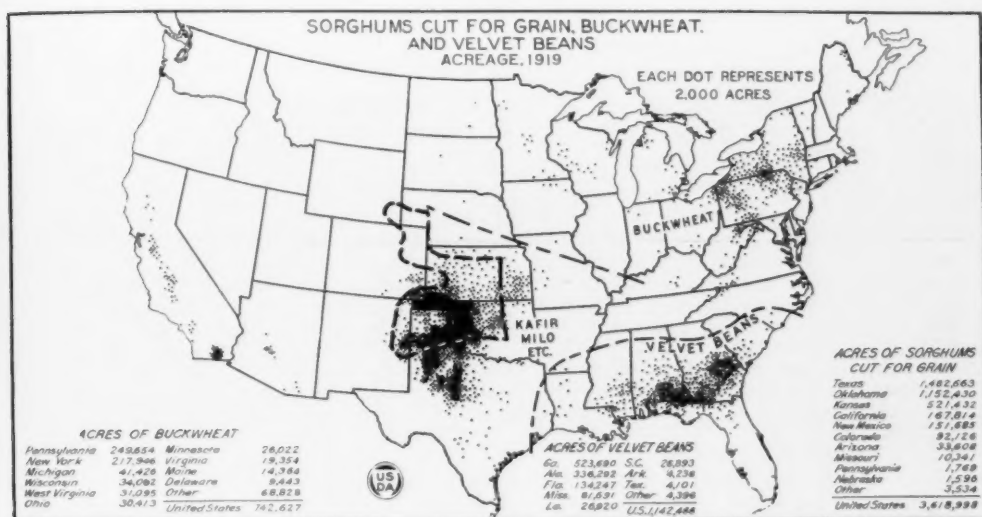


FIGURE 105.—A large proportion of the sorghum crop cut for grain is grown within the Hard Winter Wheat Region, of which the boundaries are outlined on the map (except that the southern boundary is shown too far south). Especially in the southwestern section of the region are the grain sorghums very important. In the northwestern section the season is too short and the summers too cool to permit them to mature. (1921 Yearbook, U. S. Dept. of Agr.)

with increasing rainfall to 4 or 5 feet in the eastern portion. This limey layer, which, perhaps, marks the normal depth of penetration by the rains, disappears near the eastern margin of the region, the rainfall being sufficient, apparently, to percolate entirely through the soil and carry away the lime and other salts in solution.

These brown silty soils with a level to rolling surface include about 85 per cent of the land in the Kansas portion of the region, but only about 50 per cent in the Texas Panhandle portion, and perhaps no larger proportion in the Oklahoma

“blowing” by the winds. However, it is unlikely that there is another region of equal area on the continent, outside the Corn Belt, where so large a proportion of the land, fully 80 per cent, is suitable for crop production.

LAND UTILIZATION

Nearly a third of the region, or about 23 million acres, was in crops harvested in 1919, but the proportion varied widely in different portions of the region. About 60 per cent of the land area was in crops along the humid eastern margin, but only about 10 per cent along the arid western

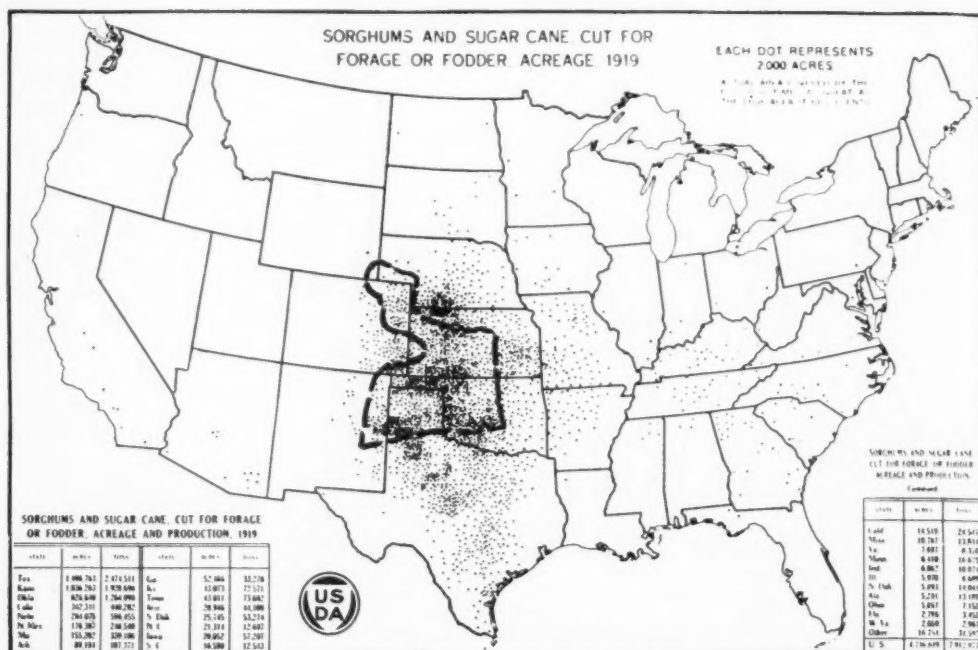


FIGURE 106.—The sorghums can be grown for forage or fodder farther north and west than for grain. In every county in the Hard Winter Wheat Region, the sorghums are grown for forage and they extend, moreover, entirely across the western portion of the Cotton Belt to the south, into the Corn and Winter Wheat Belt on the east, almost to the Mississippi River, northward across the Corn Belt into South Dakota, and westward into the Grazing and Irrigated Crops Region, as far as the Rocky Mountains. But the center of sorghum production is clearly the Hard Winter Wheat Region. In the western portion they exceed the corn crop in value, and in many southwestern counties are ever more valuable than wheat. (1921 Yearbook, U. S. Dept. of Agr.)

border. Practically all the land not in crops is used for pasture, the 2 per cent of woodland, found mostly along the streams and breaks, being used also for pasture.

The Crops

The selection of crops in this region is severely restricted by climatic conditions. The summers are too cold for the production of cotton, too dry for the extensive production of corn or oats, and even of hay, except in the eastern sub-humid portion. Thus, of the five great crops of the United States, only wheat remains.

Happily the physical conditions in the sub-humid portion are almost as favorable for winter wheat as they are unfavorable for the other major crops. The winters are usually mild and the early springs moderately moist, both of which

conditions promote the stooling of the wheat, while the dry summers not only facilitate harvesting, but also favor the early maturity of a hard wheat with high gluten content. Moreover, the almost level plains permit the use of the most efficient seeding and harvesting machinery (Figs. 101–103). Because of these physical conditions which favor the production of wheat and hinder the profitable production of other crops, except the drought-resistant grain sorghums, wheat occupied in 1919 nearly two-thirds of the crop land in the sub-humid portion of the region.

The other crops in this moister portion of the region are the sorghums grown both for grain and for forage, which contributed 11 per cent of the value of all crops in 1919; corn, which, despite the summer droughts, is produced to a small extent, especially in the northern and

eastern portions, constituting 10 per cent of the value of all crops in 1919; hay, 6 per cent, mostly alfalfa along the eastern margin (Fig. 19),²⁰ Sudan grass and grain hay farther west, and a little wild hay throughout the area. Oats, which are harvested before the droughts begin, constituted 5 per cent of the total crop value; potatoes, vegetables and fruits, jointly contributed about 2 per cent, barley 2 per cent, rye 1 per cent, cotton 1 per cent.

In the semi-arid portion lying to the southwest, the rainfall is too deficient in some years for the profitable production of wheat, so grain sorghums occupy an even larger acreage than the wheat, constituting 45 per cent of the value of all crops in 1919. The sorghums, introduced mostly from semi-arid parts of Africa, constitute the most drought-resistant crop grown in the United States (Fig. 104). They possess the peculiar power of reviving after a prolonged drought and continuing their growth with undiminished vigor. But although they can mature a crop on relatively little water, they require much heat, and are not grown extensively, except for forage, north of the Arkansas Valley (Figs. 105 and 106).

The sorghums and wheat are the dominant crops, therefore, in this southwestern portion of the region, jointly constituting 80 per cent of the value of all crops. In most of the counties no other crops are to be seen. Nevertheless, a little corn is grown here and there, mostly in moister or sandy places, and contributes 5 per cent to the value of all crops, while hay, oats and barley each add 3 per cent.

In the semi-arid section extending toward the northwest the summers are too cool for the sorghums, except for forage, and are sufficiently moist to encourage the production of corn and wild hay as subordinate crops, corn contributing about 20 per cent to the

value of all crops, and hay nearly 25 per cent. Two-thirds of the hay is made from the native wild grasses (Fig. 18).²¹ A little barley is grown (4 per cent of value of all crops), and still less oats.

Pasture

In both these semi-arid parts of the region the acreage of pasture (mostly short grass) is many times greater than that of the crops (averaging seven times as great in the southwest section and four times as great in the northwest section), but as an acre of pasture in these semi-arid regions yields products having only one-seventh to one-ninth the value of an acre of crops, the value of the crops exceeds the value of the pasturage in every county in the region. The pasturage is used principally to graze beef cattle and, to a less extent, the horses that are kept on the farms to supply power.

Livestock

The Hard Winter Wheat Region was originally the feeding grounds of vast herds of buffalo, and later, during pioneer days, of equally vast herds of cattle. Although the production of wheat is now the dominant farm enterprise, there were as many cattle in the region in 1920 as in any previous census year, except 1890. Cattle are raised on 93 per cent of the farms and hogs on 75 per cent. The average number of cattle per farm reporting, about 20, is surprisingly high, and in view of the relatively small amount of corn grown this is true also of hogs, which average 13 per farm reporting. Practically all farms have horses and nearly half have mules. The average number of horses and mules per farm is about 8. This is nearly three times as many as in the Corn and Winter Wheat Belt and even more than in the Corn Belt.

Including poultry and sheep, which are relatively unimportant, there were over five million animal units in the region on January 1, 1919, an average of 40

²⁰ ECONOMIC GEOGRAPHY, October, 1926, issue; *Agricultural Regions of North America*, Part I, by the author.

²¹ *Ibid.*

per square mile. This is somewhat fewer than in the Corn and Winter Wheat Region (48 per square mile) and less than half as many as in the Corn Belt. In the eastern sub-humid section, however, there are more units of livestock per square mile (52) than in the Corn and Winter Wheat Region.

Beef cattle are numerous throughout the region, constituting half of the animal units in the eastern sub-humid section, and two-thirds in the western semi-arid sections. Dairy cattle, on the other hand, constitute only 15 per cent of the animal units in the sub-humid, and 7 per cent in the semi-arid, sections. It is not a dairy region; nevertheless, two-thirds of the farms have dairy cattle, and only about half have beef cattle. The farms having dairy cattle average 7 head of such cattle per farm, whereas those having beef cattle average over 30 per farm.

The Hard Winter Wheat Region is one of the most important beef-producing regions of the United States, ranking next to the Corn Belt in number per square mile. It is about self-sufficing in the production of the other farm animals, except sheep. There are fewer sheep per square mile than in the other regions, except the Cotton Belt and the Sub-Tropical Crops Belt.

In the eastern sub-humid portion of the region, 62 per cent of the total crop land was devoted to food crops (60 per cent to wheat), but as only 70 per cent of the wheat is milled into flour, it would appear that only about 44 per cent of the crop area produces human food directly and 56 per cent produces feed for stock. In the semi-arid sections this portion of the crop land used to feed stock rises to about 70 per cent, and in addition the pasture, which includes five times as great area as the crops, is used exclusively for stock.

SYSTEMS OF FARMING

There are three important systems of farming in the Hard Winter Wheat Region—wheat farming, forage and live-



FIGURE 107.—In the eastern sub-humid portion of the Hard Winter Wheat Region, alfalfa is an important crop, ranking, in many counties, next to wheat and corn in value. The labor of making it into hay is avoided by some farmers by using the alfalfa fields for hay pasture. (Photo from U. S. Dept. of Agr.)

stock farming, and cattle ranching. On many farms two or all three systems are intermingled.

Wheat

About three-fourths of the farms in the eastern sub-humid section grow wheat and one-quarter to one-half in the western semi-arid sections. The average area in wheat per farm reporting was about 170 acres in 1919, and most of the remaining 50 acres of crops were corn or sorghum. In addition there were 150 acres of wild pasture. In the western semi-arid sections the farms growing wheat average 130 acres of wheat, have about 50 acres of other crops, and fully 400 acres of pasture.

Forage and Livestock

This system of farming is found principally in the western, semi-arid portions of the region. It is based on the sorghums in the southwestern section, on corn and sorghum forage in the north-western section, and in both sections on a large acreage of wild pasture, commonly three to six times that of the crops. In this system, however, the crops produce feed of more value than the pasturage. When the pasturage is the more valuable, the farms are classified as livestock ranches.

Livestock Ranching

This system is found mostly in the drier, sandier, or rougher portions of the region. The livestock ranches include usually from one to five or even ten sections of land (640 to 3,200 and even 6,400 acres). It requires at least 100 head of cattle to maintain a family according to an American standard of living, and as most of the pasture in the semi-arid portion of this region will carry only thirty to eighty head per section of land (640 acres), one to two sections of land are the normal minimum requirement for a ranch.

Relative Importance of the Farm Enterprises

The value of the wheat crop in the region in 1919 (a year of very high prices) was about 325 million dollars, to which the sub-humid eastern and central portion of the region contributed 290 millions. This is an average of over \$4,500 per farm for the 65,000 farms growing wheat in this sub-humid section. For the 9,000 farms growing wheat in the western, semi-arid sections the average value of the crop per farm was \$3,800. Out of this income, of course, the costs of production had to be paid.

The value of the forage and feed crops grown in the region in 1919 was about 270 million dollars, to which the sub-humid eastern portion of the region contributed 170 millions. It is evident that wheat is far more important than the feed and forage crops in the sub-humid major portion of the region, but the feed crops have nearly three times the value of the wheat crop in the western, semi-arid extensions of the region.

The value of the livestock slaughtered or sold annually and of livestock products was about 300 million dollars, but this does not include the value of the power supplied by the horses and mules and utilized in growing the crops and for other purposes. Dairy products constituted nearly a third of the value of all animals and animal products produced

during the year, beef cattle a fourth, hogs a sixth. Nearly one-fourth of the sustenance for the livestock was supplied by pasture.

SIZE OF FARMS AND FARM TENURE

The farms in the Hard Winter Wheat Region are large, averaging over 400 acres per farm. Along the eastern humid margin the average size is about 250 acres, whereas along the western arid margin the average size is over 700 acres. The annual value of the agricultural products, however, is fully as large in the eastern section. In the sub-humid, black-earth section which occupies the center of the region and includes nearly half the farms in the region, the average size of the farms in 1919 was 290 acres (335 acres in 1925). Of the 290 acres, 170 acres, or nearly 60 per cent, were in crops; 85 acres, or nearly 30 per cent, were in pasture (one-third improved, and two-thirds unimproved), and less than 3 acres, or only one per cent, were woodland. This woodland is practically confined to the farms along the streams. Of the 170 acres of crops per farm, nearly two-thirds, or 110 acres, were in wheat; 20 acres were in corn; 15 acres were in sorghum, 13 acres were in hay, of which 9 were tame and 4 were wild hay; and 12 acres were in other crops, mostly oats, barley, and rye. Not many farmers grew all these crops, but practically every farm grew wheat, either corn or a grain sorghum, and put up a little hay.

Along the eastern humid margin of the region only about half the crop land, or 60 acres on the average farm, was in wheat, and corn was more important than the grain sorghums. In the western semi-arid sections also only a little over half the crop land, or about 95 acres per farm, was in wheat, 90 acres were in other crops, mostly the sorghums in the southwest and corn in the northwest, and 300 acres were in pasture.

The large size of the farms and their consequent capacity to support two families favors the development of

tenancy, but owing to the recent settlement, this favoring influence has not yet exerted its full effect. In the eastern portion of the region, where the country was settled mostly in the eighties, about half the farms are now operated by tenants. Along the western edge of the black-earth belt, where settlement was not well established till about 1900, only a third of the farms are rented by tenants. Finally, along the western arid edge of the region, where the cutting up of cattle ranches into dry-land grain farms is still in progress, about one-sixth of the farms are tenant farms. For the region as a

living on farms was 600,000 on January 1, 1925, which is slightly over half of the total population of the region.

Between 1900 and 1910 the "country" population (farm population plus population living in unincorporated places) decreased in the extreme eastern section (two eastern tiers of counties), but the increase in the central and western portions was many fold greater than this decrease along the eastern margin. Between 1910 and 1920 the decrease in "country" population is shown to extend almost across the sub-humid black-earth belt, and was especially notable in



FIGURE 108.—This picture shows the level land surface characteristic of much of the Hard Winter Wheat Region. It was taken on the Todd-Fowler Ranch, near Texline, in the northwest corner of Texas. This is near the western edge of the Hard Winter Wheat Region, where most of the land is still used for grazing. Note the windmill pumping the water for the stock and the typical short grass (Buffalo grass) sod. (Photo by David Griffiths, U. S. Dept. of Agr.)

whole, about 35 per cent of the farms are operated by tenants. This percentage is slowly increasing, and in time the western portion may have almost as high percentage of tenancy as the eastern portion, but probably not quite as high, because of the larger number of livestock ranches, which are not well adapted to tenant operation, and the greater variability of the rainfall, which requires that a farmer have a considerable amount of capital to tide him over the dry years.

THE PEOPLE

The population of the Hard Winter Wheat Region is predominantly rural, Wichita, Hutchison and Salina, Kansas; Enid, Oklahoma; and Amarillo, Texas, being the only towns in the region exceeding 10,000 population. The population

Oklahoma, but population was increasing at a rapid rate in the western, semi-arid sections of the region. Since 1920 the decrease in farm population in the eastern and central portions of the region has continued, but several counties in the western sections still show an increase.

The decrease in farm population in most parts of the region during the past seven years has been accompanied by increasing size of farms and use of more efficient machinery, especially tractors and combines, which have enabled the fewer farmers to produce fully as large a volume of agricultural commodities as in the past.

Race

About 75 per cent of the farm population of the Hard Winter Wheat Region is

native white of native parentage, nearly 19 per cent is native white of foreign or mixed parentage, less than 5 per cent is foreign-born, and 2 per cent is negro. In other words, the region is peopled very largely by white native stock. These are mostly of New England origin, but some intermingling has occurred with stock originally from Virginia, Pennsylvania and several Southern States. The few foreign-born farmers are mostly Germans and Scandinavians, but there are also two Russian centers of settlement, and a few Russians are scattered throughout the region, except in the Texas portion. Many of the Russians are Mennonites of German origin.

Literacy and Religion

Illiteracy is very uncommon in the region, only about 2 per cent of the rural population being unable to read and write. But the proportion illiterate in 1920 was only a half of one per cent for the rural population of native or mixed parentage, as compared with 9 per cent for the foreign-born and 10 per cent for the negroes. The percentage of illiteracy for the native whites of native parentage is only one-tenth the average for the United States as a whole.

The farmers of the region are mostly Protestant in religion, in sentiment, and overwhelmingly for prohibition. Kansas has been "dry" for nearly a half century—rigorously dry. Many of the farmers are grandchildren of the Puritan abolitionists who flocked into the state in pre-Civil War days and swung it into the anti-slavery column, and are children of the Populists of the eighties, many of whose reforms have now been accepted throughout the nation. The crusading spirit, though quiescent, still persists in the region, and there is little sympathy for any institution which degrades the individual or diminishes the economic well-being of the community. The people are thrifty. Prior to the recent agricultural depression the per capita wealth of Kansas was reputed to be larger than that of any other state, and a larger proportion of the population had deposits in savings banks.

Whether this be true or not, it is a fact that the farmers of the Hard Winter Wheat Region have passed through the periods of drought, which characterize the Great Plains climate, and also the periods of low wheat prices, more successfully than have the farmers of the Spring Wheat Region to the north.

AGRICULTURAL CONDITIONS IN FLORIDA IN 1925

Roland M. Harper

Florida Geological Survey

FARMING, in comparison with other industries, has always been relatively less important in Florida than in other southeastern states, partly because the long coast line, extensive forests of a very useful tree—long-leaf pine—and the mild winters, make more opportunities for fishermen, lumbermen, and persons who cater to the wants of tourists, than most other states have; but mostly because of the prevalence of poor soil. Although the "boosters" in all parts of Florida are continually boasting of the fertility of their soil, there is little doubt that if we could estimate the average soil fertility of a whole state Florida would rank below all other states of the Union in that respect. Only about one-sixth of the land area of the state is included in farms at the present time, and less than half of the farm land is cultivated; and the only states that have a smaller proportion of cultivated land are in arid regions, where water and not soil is the limiting factor.

However, contrary to prevailing beliefs, the sterility of Florida's soil has been advantageous to the state in some ways. In most of the eastern states, and in fact in almost any country in the temperate zones, the most prosperous farmers generally occupy the richest soils, and vice versa.¹ But this principle does not always hold when widely separated regions, like Denmark and China, or Switzerland and Spain, are compared,² and sometimes it fails even in adjacent states, such as Nevada and Utah. In different sections of Florida the prosperity of the farmers seems to be just about inversely proportional to soil fertility.

The differences in prosperity between the Old World countries just mentioned are easily explained by the racial characteristics of the people, and the inhabitants of Nevada and Utah differ in more ways than one who had not investigated the subject might suppose. In Florida the racial composition of the population of course varies considerably in different sections, but even the dominant race varies in agricultural prosperity for other reasons.

Directing attention to the peninsular part of the state first, it can hardly be doubted that if its soils were as fertile as those of Alabama or Cuba most of the area would long ago have been occupied largely by negroes and poor whites, raising corn, cotton, peanuts, sugar-cane, tobacco, and other more or less staple and non-perishable crops. The heavy late summer rains, which have doubtless been instrumental in leaching out the fertility of the soil, would indeed interfere with cotton as a summer crop, but if that was the only difficulty, perhaps it could be planted in fall and harvested in spring if desired.³

But on account of the sterility of most of the peninsula soils, the farmers there need large quantities of fertilizers; and that being the case, such crops as those mentioned in the preceding paragraph could hardly be raised in competition with regions a little farther north that have more fertile soils. Cotton has also to meet the competition of such countries as India and Egypt, where labor is much cheaper than in the United States;⁴ it is sometimes called the "poor man's crop."

Consequently the farmers of peninsular Florida have been led to concentrate

¹ See Dr. Ellsworth Huntington's article on "The Handicap of Poor Land," in *ECONOMIC GEOGRAPHY*, October, 1925, issue; also some statistics of southern Ontario by the present writer in *Torrey*, 27: 7-8, Feb., 1927.

² See *Journal of Social Forces* (Chapel Hill, N. C.), 2: 14, Nov., 1923.

³ A wild cotton indigenous to southwestern Florida blooms in December and ripens its seeds in spring.

⁴ See article on cotton by Louis Bader in the April, 1927, number of *ECONOMIC GEOGRAPHY*; especially the concluding paragraph.

their efforts either on crops which will not grow much farther north, such as oranges and various tropical fruits, or on perishables like strawberries and vegetables, which can be produced in winter and spring, when this state has a temporary monopoly and can command high prices.² In both of these classes, of course, the competition of the cheap labor of Cuba and Mexico has to be reckoned with, and that may become more serious as transportation facilities improve, though it has not amounted to much yet, except in

States average, and ahead of all other southeastern states, in prosperity, as measured by the value of his property; and the prosperity is greatest in the peninsular portion of the state, as will be shown statistically farther on.

Almost side by side with the up-to-date fruit and truck farming with high yields per acre is found a very ancient type of agricultural enterprise with very low yields per acre; namely, stock-raising. In the pioneer days, when the country was sparsely settled and there were few



FIGURE 1.—White farmer's log house with stick chimney and split paling fence, about eleven miles north of Bristol, Liberty County. July 8, 1925. This is in a sandy long-leaf pine region, and about a dozen miles from the nearest railroad.

the case of pineapples from Cuba and tomatoes from Mexico.

To produce such crops profitably on poor soils, and in the face of tropical competition, requires a considerable degree of efficiency and coöperation, and therefore a superior class of farmers. The average farmer (or any other kind of worker), in the long run, gets for his services just about what they are worth, so that the efficient farmers prosper regardless of soil, climate, or any other environmental factor. The average Florida farmer today is up to the United

or no railroads, this was the principal type of farming in Florida, and Cuba was the chief market. Scrubby cattle and razor-back hogs ranged through the vast unfenced pine woods and prairies, and although the quality of the forage was low, and it took several acres to support one cow, the animals could graze throughout the year in the southern part of the state, and needed no shelter; thus it cost almost nothing to raise them. Even yet most of the counties in Florida have free range, so that all fields have to be fenced to keep the stock out; but the demand for stock laws is rapidly increasing, largely on account of the enormous automobile traffic, to which roaming animals are a nuisance. As in the West, the cattle business is gradually receding from the settled areas; but there are at present a few large ranches with modern equipment, espe-

² This may be illustrated by the following statistics of value of certain crops in 1919, for Florida and the United States, computed from the returns of the 14th Census.

Crop and unit	Fla.	U. S.
Vegetables raised for sale, per acre	\$227.00	\$131.00
Irish potatoes, per bushel	3.00	2.20
Small fruits (mostly strawberries), per qt.	.31	.19

Similar data for later years and other crops can be found in recent Yearbooks of the U. S. Department of Agriculture.

cially in the prairie region bordering the Kissimmee River (see Fig. 13).

Northern Florida is much like the two neighboring states in soil, climate, and agriculture. Cotton plantations with slave labor became established there before the Civil War, and general farming of the extensive type still prevails, though a few localities convenient to railroads, especially eastward, specialize in strawberries or vegetables, like the peninsula.

Reverting now to the relative importance of agriculture in Florida, some statistics on the subject may be of interest. In the earliest days of settlement the inhabitants doubtless depended

1880 to 46 per cent in 1920 (as compared with 61.6 per cent in the whole United States) and 38 per cent in 1925. The ratio of farm families to total families decreased from 45.7 per cent in 1890 to 27.7 per cent in 1910 (there seem to be no earlier or later data on this point), and the ratio of persons engaged in agriculture to all gainfully employed persons (over ten years old) from 63.8 per cent in 1880 to 28 per cent in 1920.⁶

The number, acreage, and population of farms decreased in most of the states between 1920 and 1925, while the total population was presumably increasing as usual. This decrease in the relative importance of agriculture was probably due



FIGURE 2.—Smooth hilly pasture with oak grove and two-story concrete-block house in background, in Tallahassee red hills about seven miles northeast of Tallahassee. May 14, 1926.

more on hunting, fishing, lumbering, etc., than on farming, but it is probable that a larger proportion of the population was engaged in agriculture at the beginning of the Civil War than at any time in the last fifty years. The ratio of farm population to total population decreased from nearly 50 per cent in 1880 (assuming 5.5 persons per farm) to 21 per cent in 1925, and of farm population to all "rural" population (*i.e.*, that outside of towns and cities with over 2,500 inhabitants), from over 50 per cent in

largely to the rapid substitution of automobiles for horses throughout the country, and also to a considerable variety of more or less local causes. In Florida in that five-year period the population increased 30 per cent, a rate almost unprecedented in any eastern state since the pioneer days, while the number of farms increased less than 10 per cent (from 54,005 to 59,217); the farm acreage, both total and improved, remained almost exactly stationary, and the farm population decreased about 7 per cent.⁷

⁶ Any one undertaking to verify these last figures will have to look sharply to separate lumbering, turpentine, hunting and fishing, which are important in Florida and quite different from farming, but are grouped with agriculture in the United States census statistics of occupations for 1920. (In 1880 the classification was even less logical than in 1920, lumbering and fishing having been grouped with manufacturing, and hunting with professional and personal services.)

⁷ The 1920 figures for both population and agriculture are taken from the U. S. census of Jan. 1, 1920. The 1925 figures for aggregate population are taken from the State census of Feb. 15, 1925, and those for farms and farm population from the Federal agricultural census of Jan. 1, 1925, which was the first nation-wide farm census ever taken in this country in other than a decennial year. The 1920 and 1925 figures for farm population are not strictly comparable, for the former included hired laborers who did not live on the farm where they worked, and the latter did not. But the difference due to this change of definition is probably slight in Florida. The results of the 1925 agricultural census for Florida were made available earlier than those for most other states. Preliminary returns for the several counties, in the shape of one-page bulletins, giving the number, size, and value of farms, color and tenure of farmers, and a few figures on crops and live-stock, were sent out to the newspapers by the Census Bureau at frequent intervals from March to October. Some of the first few county reports, however, did not give as much detail as the later ones, and there were obvious errors in some of them. For example, the preliminary report for Polk County, released July 3, gave that county 245,956 acres of "plowable pasture," more than all other counties combined, possibly because a cattle company with headquarters in that county, owning a large area of natural prairie (most of it in another county), had returned it as plowable pasture (which usually

The rapid increase of aggregate population was evidently due mostly to winter resort developments, and several of the northern counties which get very little tourist business showed a decrease.⁸ The increase in the number of farms combined with a decrease in farm population may be due mostly to an increase in the number of small new one-man farms in the southern part of the state, and of citrus groves whose owners live in towns and cities and are not counted in the farm population. But it is doubtless also correlated with the increasing use of machinery, which enables one man to cultivate more land than ever before.

At the same time that the farms in Florida were becoming more numerous they also increased still more in value, which is contrary to recent tendencies in most other parts of the country, and particularly in the two neighboring states. The land and buildings on the average Florida farm were worth \$5,212 in 1920 and \$8,100 in 1925, as compared with \$10,284 and \$7,776 for the whole United States at the same two censuses.

This is the first time in history that the value of land and buildings per farm in Florida has exceeded the United States average. In 1860, when the southern planters attained their greatest antebellum prosperity, and several southern states were above the national average in farm values, Florida was very thinly settled and comparatively poor, and its farm real estate values were only about three-fourths of the average. The Civil War caused a slump in every southern state, but Florida recovered more rapidly than any of the others, and by 1890 its

values were again about three-fourths of the national average, and ahead of any other southern state. The severe freezes of 1895 and 1899 wrought havoc in the orange groves and scared away many farmers of northern origin, and the farm values of 1900 were only about half those of 1890. Recovery began very soon, but in 1910 the values of land and buildings per farm had not yet reached half the United States average, and in 1920 they were only a little more than half the average; so that the rate of increase in values between 1920 and 1925 has been much greater than ever before.

If we had separate figures for white and negro farmers (which were given for each state in 1900, 1910, and 1920, and also by counties in 1910), the rank of Florida white farmers relatively to those of the whole country would be higher than the above ratios indicate, for nearly one-fourth of the farmers in Florida are negroes, as compared with about one-seventh in the whole United States.

The real increase in wealth of Florida farmers in the last few years has been even greater than the figures show, for 1920 was the year of the highest prices ever known in the history of the United States, and the dollar of 1925 had a considerably greater purchasing power than that of 1920. According to commodity price figures computed by the United States Bureau of Labor Statistics, the weighted average price of all commodities in the United States in January, 1920, was 2.33 times the 1913 (pre-war) average, and in January, 1925, 1.60 times. Applying this ratio to the values of land and buildings previously given, it would

means improved pasture), though it was absolutely unimproved wild land. But when this was questioned by the writer (in a letter) the figure was reduced to 5,956, and most of the difference transferred to "other pasture." (A similar though smaller discrepancy in the near-by county of Okeechobee went through unnoticed, though, and that needs to be borne in mind by any one trying to estimate the changes in improved land between 1920 and 1925.)

A summary for the whole state, giving the same sort of data that had already been published for counties, was issued in October, 1925, and a supplementary report, giving statistics of farm population, kind of roads, value of implements and machinery, number of sheep, goats and chickens, farm expenditures, live-stock products, etc., came out late in March, 1926. That was followed three days later by the preliminary announcement of United States totals of everything given in the county bulletins, and this revealed that Florida was above the national average in value of land and buildings per farm for the first time in its history. The final report for Florida, an octavo pamphlet of 44 pages, was issued early in June, 1926.

In July, 1925, the writer gave to the Tallahassee correspondent of the Associated Press an estimate of the number, size, value, etc., of the farms in the whole state, based on the preliminary returns from all but two counties (which two were not released until a few months later), and this was published in many of the Florida dailies. The other census publications above mentioned were each followed within a few days or weeks by similar local press bulletins in which their salient features were summarized and digested for the benefit of newspaper readers who did not have access to the originals, and special articles on poultry and cattle in Florida, based on figures in the final report for 1925, and a few earlier censuses, appeared in the Florida Grower of July 31 and Aug. 7, 1926, as well as in the daily papers.

⁸ The great boom of 1925, which was just gathering headway when the census was taken, lasted practically the whole year; and statistics of marriages, births, school enrollment, gasoline consumption, etc., seem to indicate that the population of Florida increased at least 20 per cent during that year, and has not decreased since.



FIGURE 3.—Typical negro farmhouse, with fenced garden at left, in grove of red oaks about five miles northeast of Tallahassee, Leon County. May 14, 1926.

seem that the average Florida farmer had just about doubled his wealth in five years.

But that hardly seems possible, especially in view of the fact that more than one-fifth of the farmers in the state are negroes, and a large part of the state declined in population. It may be that the price index quoted above is not based on enough commodities; for the price of building materials, rooms, and real estate has declined very little since the World War, and one can think of many common articles whose price has not changed at all since 1920 or earlier. The wages of organized laborers also have decreased very little since the war. Another strong probability is that the farmers in estimating the value of their property in 1920 did not realize how much prices had gone up, and were still thinking largely in terms of pre-war conditions.

According to the census figures, the value of the average United States farm in 1920 was less than twice as many dollars as in 1910 (\$12,084 against \$6,444, or \$10,284 and \$5,480 for land and buildings only), although the ratio of "commodity prices" was about 2.3 to 1, and the increase of population should have made the farm land a little more valuable, even if there had been no change in commodity prices.

The first of the following statistical tables shows various phases of farm population, tenure, acreage, and value for the whole state in 1925, with corresponding data for 1920, and also, wherever possible, separate figures for white and colored farmers in 1920. The data about population for 1925 are taken from the State population census of February 15, 1925, and adjusted a little to the date of the Federal agricultural census, which



FIGURE 4.—Group of negro farm buildings, a mile or two from the nearest white man's house, in Tallahassee red hills about four miles northeast of Tallahassee, Leon County. May 14, 1926. This is a region of rather fertile soil, with extensive agriculture and low yields per acre, and negroes greatly in the majority in the rural population. It is one of the few parts of Florida where cattle are not allowed to run at large; so the fields are usually not fenced, but gardens and pastures are.



FIGURE 5.—Farm on calcareous sandy loam about two miles south of Ocala, Marion County, with cabbage palms in the fields. March 8, 1914. (These trees are allowed to stand when other species are cut away, probably because they are ornamental and indicate good soil, and take very little nourishment away from the crops.)

was taken as of January 1. This agricultural census did not have a separate category for improved land, as all previous ones back to 1850 did, but we may assume without serious error that "crop land" plus "plowable pasture" in 1925 is about the same as the improved land of previous censuses, especially in Florida, where there is not much improved pasture. Interrogation points in this first table indicate data which could be ascertained in the census office from the schedules already filled out, but have not been published; and blank spaces indicate ratios that are impossible or unavailable.

The second table is devoted to animals

on farms at the beginning of 1925 and 1920, and the production of certain animal products during the year immediately preceding each census; it is for all races combined, there being no separate figures of this kind for white and colored farmers yet, which is regrettable, for they would doubtless show some significant differences. The third table treats the leading crops in a similar manner. The fourth gives the salient features of agriculture for 1925 in each of five major divisions of the state, with a few 1920 figures for comparison.

The significance of some of the figures in the first three tables would be more

TABLE I
GENERAL STATISTICS OF FLORIDA FARMS, 1925 AND 1920

	1925	1920	White	Colored
Per cent of population "rural".....	55.0	63.3	63.3	63.4
" " " on farms.....	21.0	29.1	30.3	26.8
Per cent of total population white.....	68.0	65.9	65.9	.....
" " " farm.....	71.9	68.8	68.8	.....
" " " operators.....	79.7	76.0	76.0	.....
Per cent of farm population over 21.....	.....	47.0	?	?
" " " under 10.....	26.4	26.6	?	?
Per cent of land in farms.....	16.9	17.1	.....	.....
" " " "improved".....	6.5	6.5	.....	.....
Per cent of farmers owners, and part owners.....	77.0	71.4	78.3	48.8
" " " managers.....	1.7	3.3	4.2	0.8
" " " tenants.....	21.3	25.3	17.4	50.4
Number of persons on average farm.....	4.44	5.20	4.72*	6.82*
Number of acres per farm.....	100.3	112.0	131.8	49.2
Improved acres per farm.....	38.6	42.5	45.3	33.8
Value of farm land per acre (\$). ..	70.00	37.78	39.73	21.25
Value of land per farm.....	7,028	4,230	5,230	1,046
" " " buildings per farm.....	1,060	982	1,198	310
" " " implements and machinery per farm.....	246	251	308	68
" " " live-stock per farm.....	344	654	763	308
Expenditures, per improved acre, for				
Labor (cash only).....	6.25	4.51	?	?
Stock feed.....	2.81	2.19	?	?
Fertilizers.....	5.54	4.50	?	?

* See explanation in text.



FIGURE 6.—Prosperous dairy farm in calcareous hammock land a few miles south of Ocala, Marion County. November 26, 1924.

evident if columns for United States averages had been added, but that would complicate matters too much.

It will be noticed that the number of persons per farm is considerably greater among the negro population than among the white. At first glance this would appear to mean that negro farmers have large families; but the real explanation is that some negroes live as laborers on farms operated by white men.

The percentage of persons under ten years of age is approximately proportional to the birth rate, and the figures seem to indicate a birth rate of about 30 per thousand (for all races combined) on Florida farms, which is above the United States farm average, but below that for most other southern states.

The percentage of white farmers and of owners has increased in the last five years, but the farms have become smaller. The value of land per farm and per acre has increased greatly, but that of buildings has not changed much. The value of implements and machinery per farm apparently fell off a little, but when we bear in mind the increased purchasing power of the dollar since 1920, it is evident that more machinery must be used now than before, thus offsetting the decrease in the number of persons per farm. When we apply the price index correction previously mentioned to the expenditures for labor, fertilizers, and feed, we see that the amounts of those per acre must have increased about 50 per cent in five years, indicating a corresponding increase in intensity of farming.



FIGURE 7.—Peas and cabbage in newly cleared hammock land about a mile southeast of Brooksville, Hernando County. March 9, 1915.

TABLE II

SELECTED STATISTICS OF ANIMALS AND ANIMAL PRODUCTS ON FLORIDA FARMS, 1924-1925 AND 1919-1920

	1925	1920
Number of horses per farm.....	0.5	0.7
" " mules " ".....	0.7	0.8
" " beef cattle per farm.....	10.1	9.6
" " dairy " ".....	1.1	2.2
" " hogs " ".....	8.6	14.0
" " sheep " ".....	1.0	1.2
" " goats " ".....	0.6	0.8
" " chickens " ".....	34.0	28.8
Gallons of milk produced, per farm.....	326	225
" " " sold " ".....	145	61
Difference (consumed?).....	181	164
Butter produced per farm, pounds.....	26.1	21.6
Wool produced per farm, ".....	2.3	3.0
Hen eggs produced per farm, dozens.....	162	121

TABLE III

SELECTED STATISTICS OF PRINCIPAL CROPS ON FLORIDA FARMS, 1924 AND 1919 (STATE AVERAGES)

	1924	1919
Acres of corn per farm.....	9.8	14.7
Bushels per acre.....	11.9	11.2
Acres of hay per farm.....	1.4	1.6
Tons per acre.....	0.6	0.8
Acres of Irish potatoes per farm.....	0.5	0.3
Bushels per acre.....	87.9	100.9
Acres of sweet potatoes per farm.....	0.3	0.5
Bushels per acre.....	84.0	93.0
Acres of cotton per farm.....	1.5	2.0
Bales per acre.....	0.25	0.18
Acres of sugar-cane per farm.....	0.2	0.4
Orange trees per farm (all ages).....	226.0	111.0
Grape-fruit trees per farm.....	66.4	49.0
Pecan trees per farm.....	11.3	5.9
Peach trees per farm.....	4.9	6.0
Pear trees per farm.....	3.2	1.3

Between 1920 and 1925 the total number of horses on Florida farms decreased, doubtless on account of the increase of

former has increased. The decrease in the yield of Irish and sweet potatoes



FIGURE 8.—Some of the buildings of a dairy and poultry farm on sandy but moderately rich soil in the Brooksville hammock belt, about a mile east of Dade City, Pasco County. April 23, 1920.

automobiles; mules and cattle increased a little, but not as much as the number of farms; hogs decreased about one-third; sheep and goats decreased a little, while chickens showed a substantial increase. There was a considerable increase in the production of milk and still more in the amount sold, and the difference between production and sale, indicating roughly the amount consumed on the farms, also increased, showing that Florida farm children are now getting more milk than formerly, though they are still below the United States average in that respect. The production of butter and eggs per farm has also increased, while the wool crop has fallen off with the sheep.

The acreage of corn and hay has decreased, but the yield per acre of the

probably does not indicate a prolonged trend in that direction, but is more likely due to some unfavorable condition in 1924, for the general tendency is for yields to increase as the population becomes denser and farming more intensive. On the other hand, the increase in cotton yield seems too great to be permanent, and is probably due to different conditions in the two years that are compared. The decrease in sugar-cane acreage is a little surprising, in view of the strenuous efforts to develop a sugar industry in the Everglades in recent years. The number of orange trees, both bearing and non-bearing, more than doubled in five years, and the same is true of pecans. Grape-fruit also showed a considerable increase, while peaches decreased.



FIGURE 9.—Orange groves without buildings, owned mostly by people living in other states, in the lake region a few miles south of Lakeland, Polk County. (The tree at the left is a species of *Eucalyptus*.) April 24, 1920. These groves are divided into ten-acre tracts, and tended by the association that sold the land to the absentee owners.

Of course, it should be borne in mind that there is no such thing as an average Florida farm, on which all these crops are grown in approximately the proportions indicated, for some of them are chiefly confined to the northern parts of the state and others to the southern; but the figures in the table merely indicate the tendencies of recent years in the sections where the several crops are principally grown. These items could have been calculated on a per square mile, instead of a per farm basis, but the results would have been very nearly the same, for there happens to be just about one farm per square mile in Florida.

There is a great diversity of agricultural conditions in different parts of the state, but this cannot be shown adequately by means of statistics, for the county is the smallest unit for agricultural census returns, and most Florida counties are large enough to include parts of two or more natural regions. At least twenty-five regions can be distinguished in Florida, and at the beginning of 1925 there were only sixty-three counties in the state (less than half as many as in Georgia, which is not much larger). But for most readers it will probably suffice to divide the state into five sections, and give a brief description and a few statistics for each.

West Florida is that part of the state west of the Apalachicola River. The greater part of it is undulating sandy pine lands, with clay subsoil, but there

are several hundred square miles of damp sandy "flatwoods" and of red loam, and some small patches of strongly calcareous soils.

Middle Florida, between the Apalachicola and Suwannee Rivers (Figs. 1-4), is very diversified, with soils ranging from phosphatic red loam uplands to flat damp sand, but it is more fertile on the average than any of the other divisions. Fifty years ago it had about one-third of the farms and half the cultivated land in the state, though its area is less than



FIGURE 10.—Neat new farmhouse with grapefruit grove, in the lake region a few miles south of Sebring, Highlands County. November 24, 1924.



FIGURE 11.—Prosperous white farmer's home on Terra Ceia Island, Manatee County, with mango, loquat, and orange trees around the house. April 20, 1920.

one-seventh of the total. Its crops are mostly those common throughout the South.

Northeastern Florida, east of the Suwannee River and north of Orange Lake, is about half flat sandy pine woods, and the rest mostly dry sandy uplands, with patches of loamy and calcareous soils. Its southern boundary corresponds roughly with the southern limit of cotton and the northern limit of oranges.

Central Florida, from the latitude of Orange Lake (about $29\frac{1}{2}^{\circ}$) to the Manatee River (Figs. 5-9), is about equally divided between sandy uplands (high pine land) and sandy flats (flatwoods), but there are large patches of loamy or calcareous hammock land, especially around Ocala and Brooksville. It is the principal orange-growing section of the state, but is a little too cool for the strictly tropical fruits, such as pineapples, cocoanuts, mangoes, and avocados.

South Florida, the fifth section of the state (Figs. 10-18), is mostly flat and sandy, with the Everglades covering a few thousand square miles in the center, and a great deal of limestone and marl south of the latitude of Miami. Much of the limestone has no true soil on top of it, but it is usually soft enough so that it can be broken up by blasting or otherwise, enough for the growing of fruit trees.

It is near enough to the tropics for an occasional winter to pass without frost.

The next table gives the salient agricultural features of each of these five sections in 1925, with a few 1920 figures inserted for comparison.

The relative fertility of the different sections is indicated roughly by the pro-



FIGURE 12.—Celery farm on blackish peaty but probably somewhat calcareous and sulphurous soil near Manatee River about a mile east of Manatee. January 19, 1924. In the foreground is one of the strips of black paper used on both sides of each row of celery for blanching it, instead of boards, which are now too expensive. This is a very intensive type of farming.



FIGURE 13.—Headquarters of a modern cattle ranch in the dry sandy prairies bordering the Kissimmee River, about seven miles northwest of Okeechobee City, Okeechobee County. August 8, 1925.

portions of improved land, negro farmers, and tenants, but not so well by the price of land. Statistics of size and value of farms do not mean much where whites and negroes are grouped together and there is a considerable proportion of the latter, for, as the first table shows, the average white farmer in Florida is about five times as wealthy as the average negro farmer, and has a farm about twice as large. So the rather low per farm values in the northern parts of the state are evidently due largely to the large proportion of negroes there. (There are separate figures for whites and negroes by counties for 1910, but not later.)

Judging from this table, the value of farm land per acre in Florida seems to be approximately inversely proportional to its fertility, that in Central and South Florida being valued at approximately three times as much as that in the northern parts of the state in 1920 and five times in 1925.

This difference must be partly psychological, for the population of peninsular Florida has been increasing so fast lately that real-estate prices have soared, and many of the new settlers come from states where farm land is valued much more highly than most of that in the South, so that they are easily persuaded to pay high prices for the privilege of

TABLE IV
AGRICULTURAL STATISTICS OF FLORIDA BY SECTIONS, 1925

(With a few 1920 figures for comparison)

	West	Middle	N. E.	Central	South
Per cent of total population, white	73.2	46.9	58.2	79.3	78.5
" " " farm	79.8	42.4	70.9	81.9	82.5
" " " operators	81.4	50.5	74.9	88.8	93.5
Per cent of white population on farms	40.8	37.2	22.5	18.1	13.4
" " " colored	28.2	44.8	13.5	11.0	8.0
Per cent of white farm population under 10 years old	28.5	27.7	26.4	22.7	26.0
" " " colored	29.3	29.9	26.0	25.5	27.1
Per cent of land in farms, 1920	22.1	24.3	31.3	16.9	7.9
" " " 1925	21.6	21.0	27.0	18.3	9.3
Per cent of land improved, 1920	9.8	12.6	13.6	5.1	1.3
" " " 1925	8.3	9.4	10.4	4.9	2.0
Number of persons on average farm	5.24	5.38	4.66	3.67	3.84
Number of acres per farm	91.1	105.7	121.0	86.5	117.3
Improved acres per farm	36.1	50.8	51.6	25.7	27.0
Value of farm land per acre, 1920 (\$)	19.30	16.70	20.30	65.90	65.90
" " " 1925	17.95	15.80	12.75	129.00	135.35
Value of land per farm, 1925 (\$)	1,635	1,670	2,600	11,200	15,922
" " buildings per farm	585	710	964	1,390	1,453
Expenditures in 1924, per improved acre					
For labor	1.09	1.58	2.66	13.91	19.30
For stock feed	0.78	0.35	2.24	5.65	7.93
For fertilizers	1.58	1.26	2.31	12.60	15.86
Cows milked, per farm	1.37	1.25	1.11	0.84	0.93
Gallons of milk per cow milked, 1924	231	205	290	400	426
" " " farm, produced	315	256	333	336	396
" " " sold	41	31	183	97	276
Difference (approximate home consumption)	274	225	150	239	120

living in a mild climate. It is also probable, though we have no statistics on that point, that the farms in the peninsula are much more concentrated in the vicinity of cities and railroads than in northern Florida, and that alone would

eral of the northern counties are below the national average. In Palm Beach County, for example, where most of the farming is done within a mile of the Florida East Coast Railway, on soil that is over 90 per cent silica, the value of



FIGURE 14.—Small old-fashioned farmhouse in east coast strip near Quay, Indian River County, with bananas at left and mangoes at right. August 23, 1923.

naturally make the farm land more valuable, even if other things were equal.

The proximity of the farms to cities and railroads, together with a climate that favors the production of strawberries and vegetables in winter, when they command a high price, makes farming much more specialized and intensive in the southern parts of the state. The value of crops per acre in Florida is approximately double the United States average, and the difference is greatest in the southern part, for sev-

crops in 1919, per improved acre in 1920, was \$106.80. In order to get this yield, however, there was involved an expenditure of \$29.60 per acre for labor, \$17.30 for fertilizer, and \$14.50 for feed. The farm land was valued at \$131.44 per acre (perhaps \$400 for improved land), and even if the interest on that was \$25 a year it would still leave the farmer a net profit of about \$20 per acre for his time.

In northern Florida extensive or general farming, with low expenditures and yields per acre, prevails, as in most other



FIGURE 15.—Farm on old dunes of white sand bordering Indian River between Eden and Walton, St. Lucie County. Small pineapple field in foreground. August 22, 1923. Pineapples were the leading crop on these dunes 15 or 20 years ago, and many of the fields had lath shelters over them for partial shade, which meant very intensive farming; but cold weather, diseases, and the establishment of cheaper freight rates from Cuba have given the industry a severe setback.

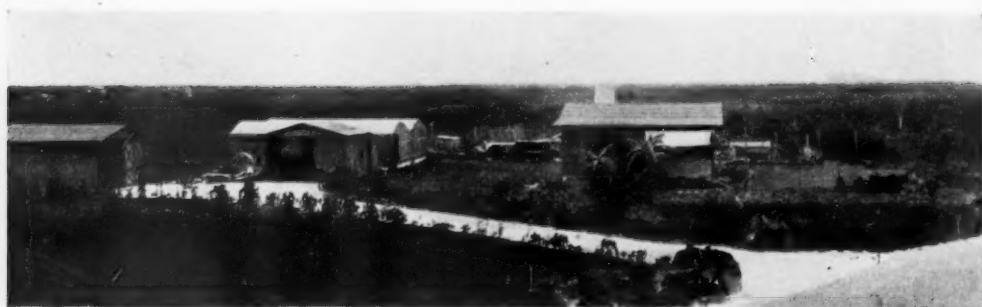


FIGURE 16.—Small new farm in the Everglades about three miles northwest of Hialeah, Dade County. August 20, 1923. Freshly plowed field of black peat in foreground. Picture taken from spoil-bank of the Miami canal, which connects Lake Okeechobee with the Miami River.

parts of the United States, and that is the principal reason why land values are lower, in spite of the greater fertility and denser population. (Low yields per acre are indeed also characteristic of some high-priced farm lands, for example in Iowa; but there practically no fertilizer is used, and the labor cost is low, on account of the extensive use of machinery, so that the farmers can afford to pay considerable rent, interest, or taxes on their land.)

Another factor which has probably had some influence in making the farmers of peninsular Florida more prosperous than those in the northern part of the state is the mere matter of distance from the main centers of population. For a farmer who can save up enough money to move his family a thousand miles or so and meet expenses until he has an income from the new farm is likely to be more efficient than one who spends his whole life in the state or county where he was born. (This is

probably one of the chief reasons why California farm values are above the United States average, and foreign white farmers have more valuable farms than native whites in most states, and the per capita wealth in Nevada is much greater than in Utah, in spite of the less favorable environment of the former state.⁹)

From the statistics of interstate migration, which have been given at every census since 1850, one can calculate approximately how far the average inhabitant of each state lives from his birthplace (and California of course ranks very high in that respect). But unfortunately no data of that sort have been published by the United States Census for single counties for a later date than 1880, and there have been many changes in Florida since then. However, it is a matter of common knowledge that southern Florida has long had a much larger proportion of immigrants from distant states than



FIGURE 17.—Large modern dairy farm on 32nd Avenue north of 54th Street (Miami), near the edge of the Everglades, about a mile east of Hialeah. August 20, 1923.

⁹ In 1920 only 32 per cent of the people living in Nevada were natives of the state, and land and buildings were worth \$20,947 per farm; while the corresponding figures for Utah were 69.9 per cent and \$9,499.

northern Florida, and the same is doubtless true of the farming population. (And state totals show that Florida leads the South in that respect, as California leads the nation.)

It is a curious fact that those sections of the state which have low crop yields

intensity of farming in different parts of the state, and the same increase in recent years, that have already been indicated. If we had figures for 1926 they would doubtless show the tendencies of the last few years to have continued, for the greatest boom ever known in



FIGURE 18.—Oranges and pineapples in field newly cleared from pine forest, and surrounded by a wall of oolitic limestone rocks picked up in the field, about two miles north of the center of Miami, Dade County. April 3, 1909. (Since this picture was taken the population of Miami has increased from about 5,000 to 140,000, and this spot is now several miles inside the city limits, and probably well covered with buildings.)

and farm values also have a large proportion of children and therefore a high birth rate, whether we consider total population or whites only. The same correlation holds pretty well for single counties also, but not so well when different states are compared; so that it can hardly be laid down as a principle of universal application.

Statistics of farm expenditures and receipts for single counties in Florida in 1925 show the same contrasts in

Florida coincided approximately with the calendar year 1925, and was most pronounced in the same regions that "developed" most rapidly between 1920 and 1925.

The illustrations accompanying this article are all from photographs by the writer. It would take several times as many to represent adequately the great variety of farming conditions in Florida, but these will give the reader a pretty fair idea of the situation.

BOLIVIA AS A SOURCE OF TIN

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BEFORE the coming of the Spanish Conquistadores, the natives in the vicinity of Lake Titicaca used tin, in alloy with copper, to make bronze. They probably did not know tin as a distinct metal, but they did know that when melted with copper it added strength, hardness, and heat-resistant qualities to the copper. Numerous articles of bronze from the ancient Inca civilization have been found in Bolivia, but the location of the ancient tin mines is conjectural.

Tin was mined by the Incas with gold, silver, and copper. In 1544 the Spanish found silver ores which carried tinstone being worked in mines at Poroco. No commercial and little local use of tin was made by the Incas at that time, and the Spanish miners rejected the ore, using it to fill cavities, crevices, and depressions in the earth about the silver mines. Even as late as 1895 small value was attached to the mineral in Bolivia as the Spanish quintal (101.43 lbs.) of *barilla* (tinstone concentrates) was then worth a few cents less than five dollars.¹

PRODUCTION OF TIN IN BOLIVIA

Until about 1895 the world's demand for tin was adequately supplied by the mining centers of Europe and Asia, but in Europe the lodes were impoverished. The Cornish mines produced only 4,000 or 5,000 tons, while those in Saxony and Bohemia were practically abandoned. Also, decreasing production of silver in Bolivia turned attention to the possible profits of tin mining. The growth of the tin plate industry, the introduction of tin in the manufacture of white anti-friction alloys and appliances, and the diminished output from the ancient tin

deposits advanced the price of tin from \$350 per ton in 1898 to \$960 in 1912. This remunerative price gave a vigorous impulse to the Bolivian industry established only in the early eighties, and it grew fast.

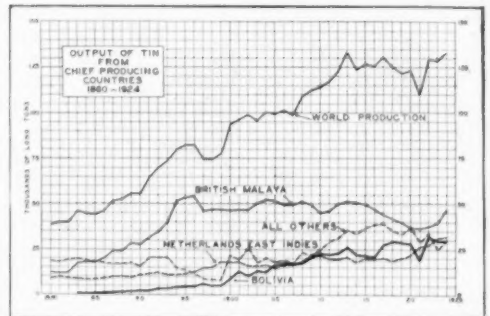


FIGURE 1.—During the present century the output of tin in Bolivia has increased about six-fold. Bolivia now produces one-fifth of the world's tin and vies with Netherlands East Indies for second place.

The production of tin in Bolivia in 1883 was 493 tons and the following year only 204 tons. It was not until 1888 that the amount mined exceeded 1,000 tons. Then for ten years it fluctuated under 3,000 tons per annum (Fig. 1). From 1898 the production increased to 25,000 metric tons, about 25 per cent of the world's supply, in 1913. For the sixteen years between 1905 and 1920 Bolivia ranked second only to the Federated Malay States in tin produced, to lose it in 1921 to the Dutch East Indies. It regained its position in 1922, again to lose it in 1923 and 1924 to the Dutch East Indies with their output of more than 31,000 tons as against that of Bolivia of 29,500 tons. Since 1911 the production of tin in Bolivia has increased in tonnage more than in any other country, the increase during the last twenty-five years being over 100 per cent.

¹ William R. Jones, "Tin Fields of the World," Mining Publications, Ltd., London, 1925.

PRODUCING DISTRICTS

The tin deposits of Bolivia are widely distributed. Six mining districts with more than forty mines are worked from north of La Paz in the Cordillera Real and its southern extension, Cordillera de les Frailes, to the southeastern part of the department of Potosi (Fig. 2).

About 90 per cent of the total output comes, however, from ten producing centers of which at least 50 per cent is produced in the mines of the Huanuni-Uncia-Llallagua district. The Araca mines in the Huanuni-Uncia-Llallagua district are the most important, producing about 41 per cent of the output of Bolivia. Other leading mines are the Araca and Caracolas in the Araca-Quimsa-Cruz district, and the Chichas and Quechisla in the Chichas-Quechisla district, which together yield about 27 per cent of the tin of Bolivia.

METHODS OF MINING

In contrast to the alluvial deposits of the Netherlands East Indies and Malaya, Bolivian tin comes largely from lodes. The lodes, dipping usually at angles of from 50° to 70°, are traversed by sharply folded metamorphic shales, and occasionally pass into the adjacent igneous rocks. The veins vary in width from mere stringers to bonanza lodes. The lodes usually are composed of streaks of pure tin ore, or near the surface, of tin ore intermingled with iron oxides, in silicate gangues.²

The lode mining methods used are as yet primitive and crude, but milling methods show marked improvement about the larger workings, such as those of Patino and Llallagua. Little effort has been made to work the veins scientifically or with regard to their future productivity; to secure the largest possible returns in the shortest time has generally been the policy.

²William R. Rumbold, "The Origin of the Bolivian Tin Deposits," *Economic Geology*, IV, pp. 321-364, 1909.



FIGURE 2.—Six districts with more than forty mines produce practically all the Bolivian tin. The mines lie in the high and rugged Andes to the east of the central plateau of Bolivia.

GENERAL FACTORS RELATED TO BOLIVIAN TIN MINING

The chief factors that influence tin mining in Bolivia are climate, relief, transportation, fuel, power, capital and labor, and location of the ore-bearing deposits.

INFLUENCE OF CLIMATE

The climatic conditions and high altitudes (11,000-16,000 feet A. T.) that prevail in the tin districts of Bolivia constitute serious handicaps to mining operations (Fig. 3). The large diurnal range of temperature (25° F.), especially in summer, and the powerful rays of the sun are enervating for labor. Above 15,000 feet the precipitation is almost all in the form of hail and snow. The wet season lasts from November to March or April, and the dry season from April to October. Violent wind storms during the day frequently hinder or even stop all traffic. The electrical storms of the Andes are terrific and demoralizing.

The rare atmosphere adversely affects personal comfort and diminishes the efficiency of man and beast. The sea level rated horsepower of all engines is decreased by from 3 to $4\frac{1}{2}$ per cent for every 1,000-foot rise above the sea level.³

Since the tin districts of Bolivia lie 11,000 to 16,000 feet above sea level, they are barren of tree growth, and only here and there in the surrounding valleys does one find stunted shrubs. On the open plateau only small shrubs grow. This absence of wood for fuel and lumber handicaps mining developments, for they must be brought from overseas, and hauled long distances over barren plateau land or rugged mountains (Fig. 4).

RELIEF AND TRANSPORTATION

The extremely rugged relief of the tin mining districts of Bolivia prevents the establishment of any other industry. The chain of the Andes south from Peru divides into two great branches, between which lies the great plateau of Bolivia over 11,000 feet high. It is in the eastern range, the Cordillera Real (14° S. to 21° S.), the higher of the two, that the tin deposits are located. The mines in many cases lie high up on the sides of steep valley walls, scaled only with difficulty. In places, the three or more small mines of a single company located in as many valleys are separated by high rugged snow-capped ridges. In some



FIGURE 3.—The Guggenheim tin mill near Pongo, Bolivia. The location of the mills and mines high up in the mountains make necessary the importation of fuel, structural materials, food, and even the labor supply. (Courtesy of F. V. Aramayo.)

In general the water supply is adequate in the immediate tin mining districts of Bolivia, but not plentiful. Properties situated near the snow line have an abundant supply of water. A few streams not always conveniently situated furnish ample water for concentration works as well as power for hydroelectric installations.⁴

³ W. G. Kendrew, "The Climate of the Continents"; Howland Bancroft, "Bolivian Tin and Its Relation to U. S." *Proceedings of Second Pan American Scientific Congress*, Vol. VIII.

⁴ Miller and Singewald, "The Patino Tin Mines," *Engineering and Mining Journal*, 1916, Vol. 102.

instances it has been necessary to build miles of aerial tramways in almost inaccessible places in order to get the ore from the widely separated mines to the large concentration plant located more advantageously (Fig. 5).

Furthermore, Bolivia's central location cuts her off from the sea, and affords her no navigable rivers on which to float her ores to the coast. Thus she is forced to depend entirely upon pack animals, wagons, or railroads for transportation.

The llama and the donkey are the only pack animals adapted to these difficult



FIGURE 4.—Transporting a huge crusher for 60 miles from the railway on the Bolivian plateau across the eastern range of the Andes at an altitude of 16,000 feet to the mines near Caracoles. (Courtesy of F. V. Aramayo.)

conditions of climate and relief. The llama is more widely used than the donkey because he is more at home in the high altitudes, and because he gathers his food en route (Fig. 6). From a few to 50 or more llamas, each carrying a Spanish quintal (101.43 lbs.) of tin, are driven by one family from a few miles

to sixty or more from the mines to railway shipping points. Llama transportation is the cheapest available transportation at present in this region.

Mules, imported in large numbers from Argentina and Chile, are used for wagon transportation. Among imported mules the death rate is high owing to



FIGURE 5.—Looking out from the sorting plant of the Argentine tin mine (15,600) near Caracoles, Bolivia. The cable shown in the right part of the picture transports the ore from the mines for five and one-half miles across a divide at 16,000 feet and down to the mill shown in Figure 3 (12,000 feet). (Courtesy of C. F. Jones.)

their inability to adjust themselves to the high altitudes. Furthermore, food has to be brought in for them. As a consequence, mule transportation is about 20 per cent higher than llama, yet mules are required to move the heavy machinery and huge timbers which must be used in the mining districts.

Three lines of railroads lead from Bolivia's mineral regions to the Pacific coast and one to the Atlantic (Fig. 2). The shortest but steepest grade outlet is from La Paz to Arica, a distance of 278 miles. Ores that are produced in La Paz and Quimsa-Cruz district are loaded and delivered at seaboard via this route without the necessity of transshipment. Coming from the La Paz region via Lake Titicaca to Mollendo, 520 miles, the cargo must be transferred from train to lake steamer, then reloaded on the Peruvian side of the lake, naturally a costly and tedious process. From La Paz to Antofagasta the distance is about 730 miles; but the meter gauge road ends at Oruro and from there to Antofagasta a narrow gauge line necessitates a transfer at Oruro which is costly and a cause of delay. However, as many mines operate south of Oruro, much ore reaches the coast without transshipment. Very little if any ore at present finds its way to the east coast via the Argentine-Bolivian Railroad opened in early August, 1925.

At Mollendo, Arica, and Antofagasta, all cargo must be transferred from train to ship. At the latter two ports there are piers extending into deep water, but they accommodate only the smaller ships, and therefore almost all cargoes must be handled here by the lighterage system. At the former, one of the roughest on the west coast, ships anchor in the open roadstead, and the ores are delivered from lighters to the ship. However, port improvements have been planned and partly executed, and before many years the transfer of cargo and passengers from, or destined to, Bolivia will be done more expeditiously.



FIGURE 6.—A llama train driver with his family and his sacks of tin concentrates camped for the night on the central plateau of Bolivia. Since the llamas gather their food on the trail, they travel only 8 to 10 miles per day. At about 4 o'clock in the afternoon they are turned out to graze until 8 in the morning. (Courtesy of C. F. Jones.)

FUEL SUPPLY AND POWER

The scarcity of fuel forms one of the chief difficulties in Bolivian mining. Even if fuel could be delivered at coast points at a low price, the railroad freight rates from the ports to the interior are so exorbitant that they would raise the cost of fuel to a price which prohibits its use. *Turba*, a resinous shrub of the tableland, *yareta*, a large mossy-looking fungus growth, and *taquia*, the dried dung of llamas, are used to a limited extent as fuels, while the Peruvian oil fields furnish a supply of fuel oil. However, it costs less to import California crude oils than to import the Peruvian product.

Because of the scarcity of fuel and its consequent high costs, various means of generating power have been attempted. In some places steam is generated by burning *taquia*, *turba*, *yareta*, coal, or oil. Anthracite gas producer engines have been used, and water wheels have been installed, but at present the majority of the large producers are using hydroelectric power and Diesel engines to generate the electricity for operation of mining and milling machinery.

CAPITAL AND LABOR

The tin mining industry of Bolivia is carried on by private companies, a



FIGURE 7.—The sorting plant at the Argentine Mine, Caracoles, Bolivia. The mine run material is all sorted as it goes over a long belt to the crushers. (Courtesy of C. F. Jones.)

large number of which are foreign. Besides the Patino interests, the investments are largely of British and American capital, with smaller amounts of Chilean, French, and Australian. Native Indian and Mestizo labor of

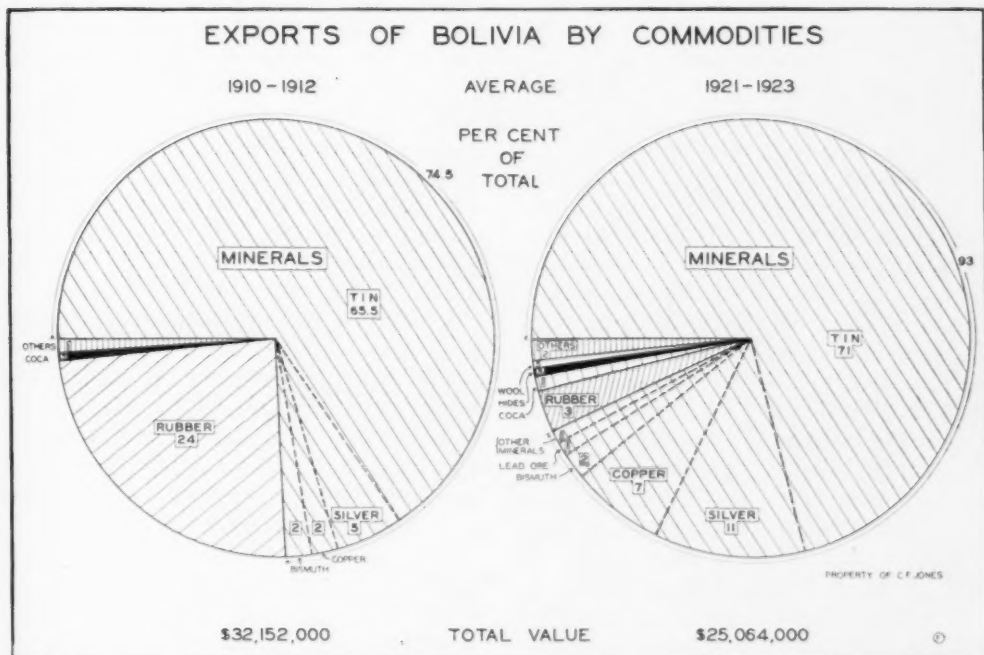


FIGURE 8.—What coffee and nitrates are to Brazil and Chile respectively, tin is to Bolivia. On it the country depends for its commercial life. It furnishes a large share of the national revenue as export taxes, and calls for a considerable share of the major imports. (Courtesy of C. F. Jones.)

both sexes is employed as workers in the mines, while the majority of the superintendents and mine managers are Americans and Europeans. Labor is not expensive, nor is it worth more than it costs. The wage scale for ordinary labor varies from 40 cents to \$2.40 a day, the average probably being about \$1.00. The laborer is not intelligent. He is lazy and seldom works when he can do anything else (Fig. 7). Feast days are numerous, and since at these times it is almost impossible to get the men to work, most of the mines close down during the holidays rather than to try to operate with the small force available. Inefficient labor, high cost of materials and fuels, poor transportation, and arduous mining operations thus combine to make mining difficult throughout Bolivia.

EXPORTATION AND DISTRIBUTION OF EXPORTS

Yet, in the face of all these adverse conditions of production and marketing, tin constitutes the major item in the export trade of Bolivia. Nothing could better represent the country than its tin resources. Tin constitutes in value almost three-fourths of the total exports of the Republic (Fig. 8).

Nearly all of the tin mined in Bolivia is exported, in the form of tinstone concentrates. Before the World War it was largely exported to England and to Germany, where it was smelted and reexported. Soon after the outbreak of the war most of the shipments went directly to Liverpool. The control of tin supplies by the British government made it difficult for the United States to obtain the tin needed for its industries. To meet this difficulty tin-smelting works were established in the United States to reduce the Bolivian concentrates. After this arrangement, the tin was almost all shipped from Chilean ports direct to New York City during the period of the war. Since the restoration of world peace the pendulum of trade in tin concentrates is again swinging away from the United States to England, chiefly

because of England's economic advantages in transporting and smelting (Table 1). Of the 31,612 long tons of tin exported from Bolivia in 1924, 29,141 long tons, or about 92 per cent, went to Great Britain, practically all of the remaining 8 per cent to northwest Europe.

TABLE I—DISTRIBUTION OF SHIPMENTS OF TIN
FROM BOLIVIA, BY COUNTRIES, 1924

Great Britain.....	29,141
Germany.....	1,675
United States.....	98
All others.....	698

TRENDS IN BOLIVIAN TIN INDUSTRY

Although primitive operations and methods of transportation still retard the progress of the tin industry of Bolivia, rapid advancement in both is being made. Modern mining machinery and scientific mining methods are being introduced and railways, automobile roads, and aerial tramways are being constructed to the most inaccessible regions. It is likely that new deposits will be discovered, for prospecting has been so difficult at high altitudes in Bolivia that a great deal of the mineralized belt has not been explored systematically. Search for primary deposits cannot be done by untrained people in the simple way that secondary deposits are prospected in other countries by the natives.

On the whole, the tin mining industry of Bolivia appears now to be expanding. Old abandoned dumps and smaller deposits of all kinds are being profitably worked because of the great demand, and consequent high price. It seems that the total output may not greatly increase, but that the present output can be maintained for some years. However, with the decline of the rich placer deposits of the Netherlands East Indies and Malaya, expected in the next decade, the world must turn more and more to Bolivia for this valuable metal. Within the next ten or twenty years Bolivia may become the chief source of the world's tin supply.

THE TRADE OF URUGUAY

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URUGUAY, the smallest South American republic, with only 72,150 square miles, an area smaller than that of British Guiana or about 6 per cent of that of Argentina, holds a distinctive commercial position. In 1925 with a total foreign commerce of 200,594,000 dollars, one-eighth as much as Argentina, it held fourth place in the trade of the continent; year in and year out it vies with Peru, for a long time the leading commercial country of the West Coast, for fourth place. In per capita trade, it has second place with 103 dollars, which equals three-fifths the per capita trade of Argentina.

This small region, which has had a stormy political career as a buffer area in the early days between the Portuguese on the north and the Spaniards on the southwest and later between two great republics, has the most nearly pure European population of any South American country. It was sparsely sprinkled with fierce warlike Indians, who strenuously resisted the colonists and consequently were largely driven out or killed off. Therefore, the population today consists of about 90 per cent white (pure European stock), 8 per cent mestizo, and only 2 per cent Indians and negroes. Although the country has a sparse population (1,500,000), the uniformly high character of the people, in contrast to a considerable part of those of other countries of South America, favors trade expansion.

Even though Uruguay is a small country, it has almost no waste land. From the standpoint of climate, no area is sterile, for summer heat and winter cold in the lowest and highest places do not prevent the utilization of most areas in all seasons. An evenly distributed rain-

fall of 40 to 50 inches per year favors the growth of excellent grasses; only 3 per cent of the area supports a forest growth. No monotonously level expanses, like the pampas of Argentina, interrupt the panorama of rolling subdued hills, a southern extension of the old Brazilian Highlands. Here and there marshy strips along the streams, rocky ledges, and sandy wastes constitute unproductive districts; yet slightly more than 87 per cent of the total area consists of productive lands in stock-raising and agricultural establishments.

Furthermore, in proportion to its territorial expanse, Uruguay has the best transportation facilities of any South American country. No mountain barrier rises between the interior and the sea. Its 1,650 miles of railway radiate from Montevideo, the chief port and city, to various parts of the Republic. The ocean, the Rio de la Plata, and the Uruguay place more than half the national boundary in direct contact with cheap water transportation, a factor of prime importance in the commercial development of Uruguay.

THE GROWTH OF TRADE

The introduction of cattle and sheep into the "Banda Oriental" by Spaniards from Buenos Aires at the beginning of the seventeenth century paved the way for the trade expansion of that region, later known as Uruguay. For almost three centuries, as in Argentina, hides and skins, wool, and tallow constituted the sole commercial product of the unfenced ranges, when the cattle roamed at will and were hunted like wild beasts; then little or no attempt was made to utilize the carcasses of the animals, which were left on the plains for dogs and

buzzards. In 1793, *hacendados* reported 450,000 head of cattle killed each year for hides. With little or no attention to the flocks and herds, open range grazing, a sparse population, and a slow demand for these non-perishable products of a pioneer cattle region, the trade grew slowly. In 1860, the exports totaled less than 8 million dollars.

During the last 60 years, the value of Uruguay's commerce has increased ten fold, from 20 million dollars in 1865 to 202 million in 1926 (Fig. 1). While various years registered marked fluctuations, the general growth has been favorable. For most of this period, the exports have exceeded the imports. From the standpoint of trends, this period falls naturally into two parts: 1865 to 1905, and 1905 to 1926.

The first part of about 40 years witnessed a slow but gradual growth of the exports and the imports from about 10 million dollars to 30 million each. The principal factors in the trade expansion of this epoch include the division of the open range of many of the *estancias* into paddocks or fields enclosed by wire fences, the establishment in 1865 of the meat extract factory at Fray Bentos on the Uruguay, the increase in the numbers of sheep from 796,000 in 1852 to 18,608,000 in 1900 and of cattle from 1,800,000 in 1852 to 6,800,000 in 1900, the growing market for wool, hides and skins, *tasajo*, and railway construction. During these years, thousands of herds and flocks were driven across the northern frontier and millions of bales of *tasajo* flowed along the same channels into Brazil, the chief market for low-grade meats, the only kind furnished by the inferior Uruguayan cattle of those days; hides and skins and wool moved in huge quantities to northwestern Europe.

The period 1905 to 1925, as in most South American republics, witnessed marked advances and exasperating reverses, but in spite of these, the exports of Uruguay rose from 30 million to 108 million dollars. At the outbreak of the war, the imports dropped sharply and re-



FIGURE 1.—The ten-fold increase in the value of Uruguayan commerce during the last sixty years represents a remarkable expansion and evolution of the animal industries, for throughout this period the products of the range constituted more than 90 per cent of the total exports.

mained at a low level for several years. A number of conditions contributed to this great period of growth in Uruguayan commerce. Shortly after 1900, the treacherous fighting and the looting of the public treasury by the two hostile factions within the country (the *Colorados* and the *Blancos*) ceased, allowing the country to move forward unhindered by repeated revolutions, factional quarrels, and rife unrest, which had torn at the vital organs of the small Republic almost from the day of independence. An improvement in the herds and flocks by the importation of pure-bred stock and the introduction of modern methods into the *estancia* life of the country increased greatly the value of the products. The establishment of the *Frigorífica Uruguaya* on the banks of the Rio de la Plata in 1905 started the exportation of frozen meat, a trade which assumed large proportions in a few years. The striking increase in numbers of sheep to 26,280,000 in 1908 and cattle to 8,190,000, followed by wholesale slaughtering of all kinds of animals, put enormous quantities of animal products into commercial channels.

THE EXPORT TRADE

The pastoral industry furnishes about 90 per cent of the total exports. It constitutes the basis for the economic, commercial, political, and even social life

of the country. In no other South American republic does one industry play so vital a part in the national welfare. This is inevitable in a country so richly endowed with grazing lands and so miserably handicapped for any other resources. Fully 80 per cent of the total area of this small nation is devoted to pastoral activities.

This dominance of the grazing industry results from favorable physical factors and economic conditions. The mild climate with an annual rainfall of 40 to 50 inches, in general fairly evenly distributed throughout the year, pro-

region has its handicaps. It is subject to severe droughts, when the pastures dry up and the animals perish by the millions. In 1914, 600,000 cattle and 5 million sheep died from starvation and disease; the drought of 1916 caused the death of $1\frac{1}{2}$ million cattle. In most years locusts swarm south across the country by the millions devouring practically all vegetation as they migrate. The northern half of the country, as a consequence of its warm climate, is infested with ticks, which take their toll of the animals and make necessary preventative measures for cattle moving out of



FIGURE 2.—For centuries sheep contributed the leading export product of Uruguay. Only recently has it lost first place to meats. The rolling and well-drained character of the land in Uruguay favored the raising of sheep. Wool produced in a remote region of sparse population could well stand the cost of transportation to distant markets. But the peak shipments of wool may have been passed. (Courtesy of Pan American Union.)

vides nutritious grasses in all seasons, and permits open range grazing at all times. Thus, feeding in expensive sheds is not necessary. While the summers are hot, rather constant refreshing breezes alleviate the heat of the summer day and pump most of the water for the cattle. The rolling green pasture lands are well drained and, consequently, excellent for sheep; in addition, the numerous small streams furnish water for the thirsty roaming animals. The whole country lies near the sea or has transportation facilities, which provide outlets for the products of the range (Fig. 2).

In spite of these favorable factors, the

the zone, and retard the improvement of the herds in this area. In addition, the hoof-and-mouth disease, which occurs once or twice a year, causes considerable loss of flesh and some loss in life, but since the cattle fatten quickly on the cheap grass, the loss is not considered serious.

Various economic conditions favor the dominance of the grazing industry. They include the sparse population with a traditional preference for a free open life on the range, large land holdings, and profits in the industry. Omitting the city populations of the capitals of the departments, Uruguay has a population

density of about fourteen persons to the square mile; few immigrants flock to Uruguayan shores, for the country has little need for them with its huge land holdings. All the cattle lands of Uruguay are divided among 31,400 properties. Large *estancias* common to most parts of Uruguay favored the extensive development of the animal industries; they afforded the pasturage for thousands of animals under one management. They gave through huge profits from a grazing industry on a gigantic scale the funds sufficient for a comfortable living and good education for the *estanciero* and all the members of his family, and to introduce imported pure-bred stock, a factor of prime importance in the evolution of the animal products in the export trade.

WOOL

For three centuries after the introduction of cattle into Uruguay from Argentina in 1603 and sheep five years later, wool, hides and tallow constituted the chief commercial products of this pioneer grazing country. Wool easily produced in this remote region, because of its high value in proportion to its weight, could stand the cost of transportation to distant markets, without appreciable deterioration. Although the sheep industry languished, little attention being given to the improvement of the flocks, for more than 200 years, wool led all other commodities in commercial importance; it constituted two-thirds of the total in 1900 and more than half as late as 1910. The exports rose irregularly from about 50 million pounds in 1900 to 178 million in 1912 (Fig. 3). This growth corresponded with the great increase in the number of sheep from 18 million in the former year to 26 million in 1908. Then the overstocked ranges and the severe droughts of 1914 and 1916 caused the death of almost one-fourth of the sheep of the country, thus reducing the exports of wool to 67 million in 1916, only slightly more than those of 1900. Excepting the high shipments reached in

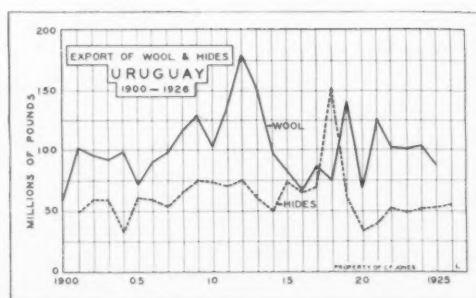


FIGURE 3.—The shipments of both wool and hides increased greatly from 1900 to 1912. Since 1914 the average exports have been at the level of those of 1910-1914. The peak in hide exports in 1918 resulted from an unusual world demand for leather and the unprecedented droughts of Uruguay in 1914 and 1916, when millions of animals perished.

1919, resulting in part from post-war boom prices, the exports of wool have increased only slightly; during recent years the level of shipments remained about the same as that of 1901-1904.

In spite of the great decrease in the number of sheep and the decline in the export of wool since 1912, the value of the product is greater than that of the years of peak shipments. The pure-bred and the cross-breed sheep, which have replaced on many *estancias* the native breeds of inferior sheep, yield twice as much wool of far superior quality than the old type of animal. The better wool and the high prices obtained for it account for the great value of the shipments of recent years.

On the other hand, the exports of wool consist mostly of greasy fleece, with very small quantities of scoured and semi-scoured wool. In spite of a marked improvement in the quality of the fleece by the importation of Rembouillet and Merino rams, the wool grades low in the world's markets because it generally becomes foul with dirt and burs during protracted droughts. However, wool constitutes almost one-third of the total exports of Uruguay, being a close second to meat products, which replaced it in first rank only recently. The per capita shipments of wool alone equal about fourteen dollars, which is greater than the total per capita trade of the Republic of Bolivia.



FIGURE 4.—Racks of hides drying at Saladero Clouzet y Cia, Cerro, Uruguay. Future shipments of hides will depend upon the meat packing industry, as the old days of hunting animals for hides and tallow have passed. (Courtesy of Pan American Union.)

As in Argentina, the peak shipments of wool from Uruguay have been passed. The high level of 1912 or even that of 1919 may not be reached again, but an export of 75 to 100 million pounds per year may be expected. After the disastrous droughts of 1914 and 1916, the World War, and the post-war overstocked markets and low prices, the numbers of sheep in the country again have increased to 14,400,000 in 1924. With an improvement of the breeds of sheep and the scouring and grading of wool, the Uruguayan product can compete better with that from other countries. Yet the ranges are stocked to capacity, cattle replace sheep in certain districts, and crop production and mixed farming encroach year by year upon the sheep domain of former years.

HIDES AND SKINS

Hides and skins, as in Argentina, were associated export commodities of wool for centuries. They were produced cheaply, could be handled easily and transported long distances without marked deterioration. In colonial days, cattle and horses roaming the rolling hills of Uruguay, were hunted like wild animals for their skins, which when

salted or dried could wait months in remote corners of the world for the uncertain means of transport of the times. As late as 1793, cattlemen in Uruguay reported as many as 450,000 cattle slaughtered each year for their hides only.

While hides were a primary product of the animal industry for 300 years, they have come to be, during the present century, a by-product of the slaughtering industry, except for a few horse-hides. The shipments of hides show marked fluctuations in response to various conditions. Striking increases followed the serious drought of 1914, and 1916, and the rapid growth in the meat industry from 1916 to 1918. In 1918, the exports reached 152 million pounds, almost three times the average, while they dropped in 1921 to 34 million, the lowest figure during the last 25 years (Fig. 3). In spite of great fluctuations, hides constitute a profitable source of revenue for Uruguay; they make up in value about one-fifth of the total exports. The products of the present command higher prices than those of old because of their better quality. The future shipments of hides and skins will depend primarily upon the meat packing industry (Fig. 4).

MISCELLANEOUS ANIMAL PRODUCTS

Other than hides, wool, and meats, various miscellaneous animal products constitute about 8 per cent of the total exports of the country. Among these tallow and grease, by-products of the packing, canning, and extract industries, contribute 4 per cent; frozen meat offal, and canned tongue, the preserved instruments of bovine speech, 1 per cent; horns, bones, and hair, adornments for the pocket knife, and the brush, 1 per cent; and meat extract, the most concentrated form of beef, 1½ per cent.

Meat Extract

Soon after the establishment in 1863 of "Liebig's Extract Plant" at Fray Bentos on the Uruguay, meat extract assumed a rather important place in the trade of the Republic. This plant with four others, when native cattle were cheap, reduced tens of thousands of animals each year to the pathetically diminished form of beef extract, packed in tins containing about 110 pounds; each tin contained on the average the substance of fifteen animals. This concentrated expensive product with its high value per unit of weight could well stand the cost of transportation to distant markets.

Shortly after 1900, more than 100,000 cattle per year were used in the extract factories; in 1913, 81,000, but in 1921 only 15,900. The exports of extract averaged before the war about 1½ million pounds; during the World War, when the demand for foodstuffs was great, the shipments rose to 5 million, but at present this commodity accounts in value for only about 1 per cent of the total exports. With an active market for high-grade meats and the improvement of the cattle of Uruguay, the exports of extract probably will not increase greatly.

MEATS

In contrast to wool and hides, meat products have come forward in the trade of the country only during the last fifty years. Before that time, the carcasses of

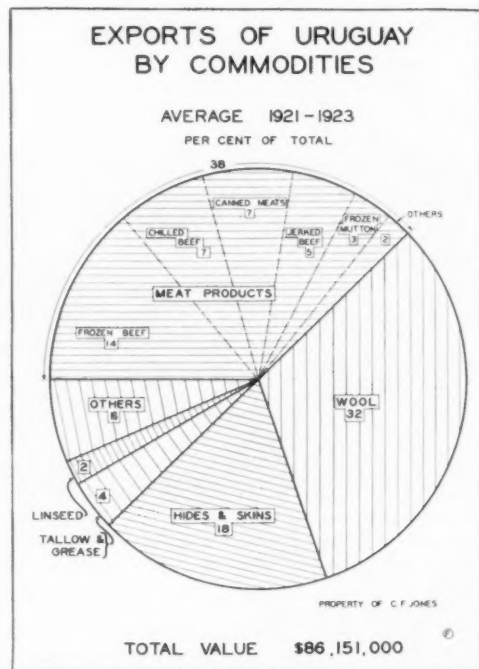


FIGURE 5.—Until recently animal products contributed as much as 95 per cent of the exports of Uruguay. Farm products, which entered the trade only a few years ago, now constitute (1925) 10 per cent of the total. This change marks the beginning of an evolution of agricultural commodities in the commerce of the country.

the animals were of little value, since they could not be transported in quantities for long distances to the markets. In the old days, thousands of sheep were driven to brick-kilns, slaughtered on the spot, and their bodies, stripped of the hide, were flung into the furnace to feed the fires. Cattle skulls and horns lay everywhere; in some places they had been piled to form fences. But the rise of the "jerked beef" industry, the development of refrigeration and cold storage transportation, the establishment of modern slaughtering plants, the increasing demand for meats in north-west Europe, and the marked decline of beef exports from the United States following 1900, have combined to advance Uruguay, in spite of small area, protracted droughts, the tick pest, and the hoof-and-mouth disease, to second place as a beef exporting country; beef ship-

ments in 1923 amounted to 357 million pounds, 12 per cent of the total world exports of that year.

The meat exports of Uruguay include a variety of products. In the order of increasing importance for 1921-1923 (three-year average) they were: frozen mutton, "jerked-beef" (*tasajo*), canned meats, chilled beef, and frozen beef (Fig. 5).

Frozen Mutton

In contrast to that of Argentina, frozen mutton has played a very small part in the meat trade of Uruguay. In many sections of the country, mutton is still considered unworthy of even a beggar's acceptance. The old native breeds of sheep produced an inferior quality mutton. In spite of the introduction of Lincoln and Romney Marsh breeds, the freezing plants, and the declining production in other sheep regions, the exports of mutton from Uruguay have increased but little since 1909 (Fig. 4). The shipments now make up only 3 per cent of the total exports. A large increase in mutton exports is not to be expected because many of the sheep breeders of the country are now crossing their coarse wool ewes, which constitute the chief mutton types, with the Rambouillet and Merino rams in order to produce a finer fleece, the chief product of the sheep industry of Uruguay.

Jerked Beef or *Tasajo*

The first attempt in Uruguay to utilize the carcasses of cattle in a commercial way was the manufacturing of *tasajo*, or "jerked beef." About 1850, the salt-beef industry began on a considerable scale. By 1889, 93 million pounds were exported. As a lean animal was preferred, the native cattle of Uruguay were ideal for this kind of meat. After the animals were slaughtered all bones were separated from the meat, which was cut in strips and dried on racks in the sun. It was then placed in brine-pans, covered with salt for four to six days until

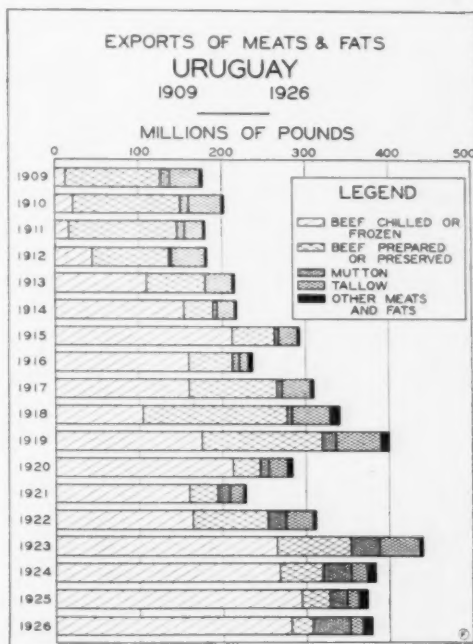


FIGURE 6.—The meat exports of Uruguay doubled between 1909 and 1926. The shipments of chilled and frozen beef, meats of good quality and high prices, increased from a few million in 1909 to almost 300 million in 1925 and 1926, placing Uruguay in second place as a world exporter of beef, in spite of the small area of the country.

perfectly dry and ready to be baled. In this condition it keeps for a long time even in tropical climates and is cheaply transported without refrigeration.

Shortly after 1900, Uruguay had twenty *saladeros*, thirteen in Montevideo, seven on the banks of the Uruguay, and one at Paso de los Toros in the interior of the country. During the years 1904-1908, an average of 553,000 head of cattle were consumed by these plants, which produced a yearly average of 100 million pounds of *tasajo*. The output moved chiefly to the markets of Brazil and Cuba, but smaller quantities went to Portuguese colonies, Porto Rico, and even to Spain and Portugal, whose inhabitants appreciated this form of dried meat. In 1909-1913, Brazil took 53 per cent of the total and Cuba 28 per cent.

Since 1912, the production of *tasajo* has declined greatly. Brazil, formerly the

chief market, now takes little because of an import tariff and the development of its own meat industry. The improvements in the grade of Uruguayan cattle and the modern packing plants have opened an active market in Europe for higher priced meats.

Thus the *saladeros* utilize at the present time only about 12 per cent of the cattle killed. *Tasajo* constitutes now only 5 per cent of the total exports of the country; Cuba and other West Indies Islands form the chief outlet for this product. Cuba buys practically no other kind of beef and Uruguay supplies all the *tasajo*.

Canned Meats

Although the canning plants, which utilize a medium-grade animal, between those for the *saladeros* and the freezing plants, turned out a product amounting to 7 per cent of the total exports of the country in 1921-1923, this industry is on the decline. In 1909 prepared and preserved beef (*tasajo* and canned beef) made up three-fourths of the shipments of meat products (Fig. 6). Since then, except for the war years, when a large demand for this kind of meat for the armies existed, the exports have been small. The canning plants must give way, as the cattle industry improves, to the modern packing plants which turn out the higher grades of meat.

Frozen and Chilled Beef

The most remarkable development in the trade of Uruguay during the present century has been the increase in the exports of frozen and chilled beef. The modern meat packing industry dates from 1905, when the *Frigorífica Uruguay* began operations. In that year the exports of frozen beef amounted to about 4 million pounds. They increased slowly until 1909, when they equalled 12 million; since then they have grown to almost 300 million in 1925. Now four modern packing plants turn out the surplus meats, which make Uruguay the second beef exporting country of the

world. Frozen and chilled beef constitute one-fourth of the total exports of the Republic.

Most of the animals slaughtered by the modern packing plants make frozen beef rather than chilled beef, owing chiefly to the grade of animals and the conditions under which they are produced. While cattle owners have been improving their herds, by the importation of excellent breeding stock, many of the cattle do not dress into choice chilled beef. In spite of nutritious native grasses throughout the year in most parts of the country, serious droughts do occur, unpredicted, and force many animals to the plants in poor flesh. The northern half of the Republic lies in a tick infested zone. In the central districts of this region the methods of breeding have not attained the standards characteristic of the fringe bordering the great rivers of the west and south. The cattle, although fat, are shaggy of coat, lack the finish of the more aristocratic Hereford, and exhibit strikingly, through their shape and varied colors, the *criolla* or native qualities. Also alfalfa for fattening ranges has not been employed to the extent that characterizes many *estancias* in Argentina because (1) the native grasses of Uruguay are somewhat richer than those of Argentina; (2) the pastures, in general, do not die down; (3) alfalfa, it seems, does not do so well on the rolling plains of Uruguay as on the flat pampas of Argentina; and (4) the pressure for high-grade cattle in Uruguay has not been so great until recently, as that in Argentina. Many breeders, who specialize in high-grade cattle, sow oats for winter and spring grazing so that the animals will grow and put on weight throughout the mild winter season.

Despite these handicaps, and the effect of the serious droughts of 1914, 1916, and 1924, and the post-war crisis, the meat packing industry progresses. The demand for good cattle by the packers to meet market conditions in Europe leads to a continual improvement in the quality of the cattle. In 1924, the Republic

had more cattle (8,400,000 head) than recorded in any other census year.

The future of the meat trade of Uruguay is somewhat uncertain. Unlike Argentina, the country does not have large areas of unutilized lands. As a whole, the lands in stock-raising establishments, which include fully 80 per cent of the area of the country, are well stocked. Considerable districts, overgrazed during the decade following 1910, have grown up with *espartillo* grass and

for high-grade cattle, and mixed farming, an evolution which will take place slowly. In spite of these trends, under the stimulus of an active demand for high-grade meats in Europe, the exports of Uruguay may increase considerably beyond the level of 1925. With the present number of animals improved in quality through years of breeding, hundreds which now go into *tasajo*, canned meats, or extracts could swell the trade in chilled and frozen beef (Fig. 7).

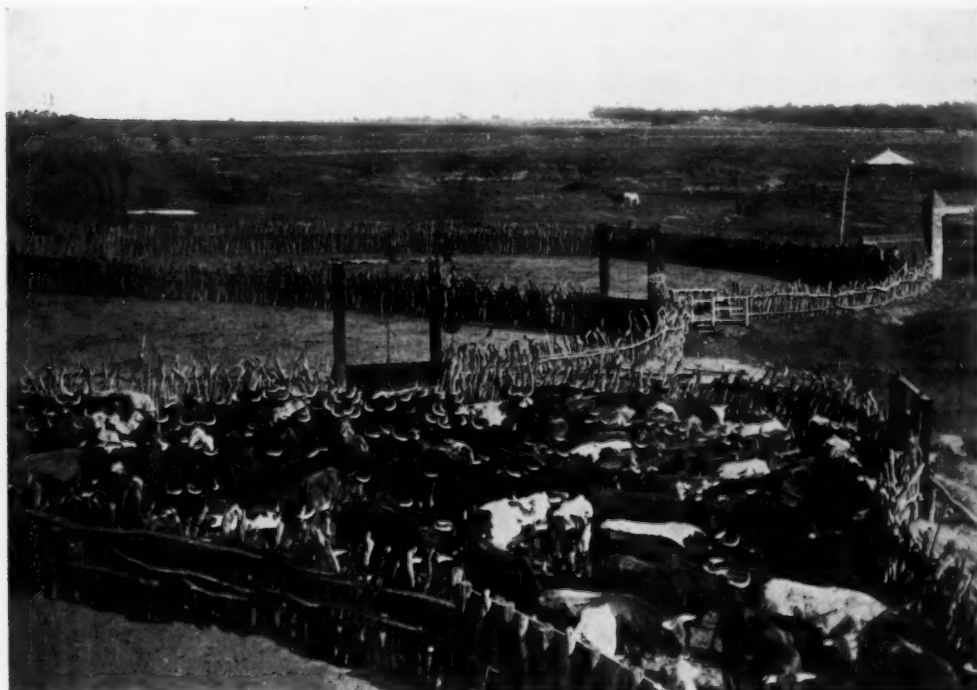


FIGURE 7.—The mixed native cattle of Uruguay lack the finish of pure-bred stock; they dress into frozen beef, which goes chiefly to continental Europe. The improvement of the herds will increase the importance of Uruguay as a beef exporting country. (Courtesy of Pan American Union.)

noxious weeds; only by plowing and replanting can the original carrying capacity of these areas be restored. Labor and equipment are not available for this purpose at present. While the numbers of animals may be increased by the extension of planted forage crops, the sparse population and the lack of a significant influx of immigrants will retard any marked development along this line for years to come. A decline in the sheep industry will release some land

PRODUCTS OF THE FARM

Although climate, relief, and soil favor the production of a great variety of crops in most areas of Uruguay, the products of the soil play an insignificant place in the commerce of the country. In fact, farming is little developed in the Republic; about two million acres, or $4\frac{1}{4}$ per cent of the area of the country, are under cultivation. Also only 7 per cent of the population are engaged in crop production. Nearly all the cultivated land,

which is devoted largely to grains, seeds, and vegetables, lies in the five southern departments of Canelones, Colonia, San José, Minas, and Florida—departments in close proximity to Montevideo and the Rio de la Plata. With this small area devoted to crops the country barely supplies its own wants, although in years of abundant harvests a small surplus remains for export.

A number of conditions have retarded the expansion of the crop areas. The *estancieros* with extensive land holdings have had huge incomes from the sheep and cattle industries without much effort. No economic pressure forced them to consider the cultivation of the soil. The population of the whole country is sparse; these people, composed chiefly of herders not accustomed to the laborious planting, tilling, and harvesting of crops, prefer the easy life in the saddle to one of working the soil. No large stream of immigrants, as in Argentina, entered and of necessity broke the sod for crops; the persistent pastoral estates did not make room for them. The periodical appearance of grasshoppers or locusts with their all-devouring appetites catch the crops, except wheat and flax, at the height of their vegetative growth when most appetizing to these voracious pests.

In the face of these disadvantages, crop production expands and encroaches upon the pastoral domain. In 1921–1923, linseed made up 2 per cent of the total exports of the country. The shipments of wheat and flour are increasing; in 1924 and 1925 they surpassed in value those of linseed. The development of transportation, the influx of immigrants, reverses of one kind or another in pastoral activities, and an active demand in the world's markets for cereals and linseed will force more and more of the grazing lands of Uruguay under the plow, and will increase the import purchasing power of that small country.

THE IMPORT TRADE

Since manufacturing industries in Uruguay are of little consequence, the im-

ports consist almost entirely of manufactured commodities of one kind or another. The small manufacturing establishments of the country are engaged in the primary preparation of the products of the range for the export movement. This trade situation naturally grows out of the handicaps hindering large scale manufacturing developments.

Uruguay lacks the resources and facilities for significant industrial operations. It has neither coal nor petroleum of importance. Only 3 per cent of the area supports a forest which might furnish some fuel for power. While the country has a network of streams, they supply little or no hydro-electrical energy. Basic minerals, as iron ore, copper and others are not present in Uruguay. The sparse population, and a small immigrant class, do not supply the necessary cheap labor for manufacturing. In addition, the landed aristocracy, supported by huge incomes from vast *estancias*, has not favored many industries.

In spite of these disadvantages, a number of commodities, such as flour, shoes, furniture, brick, tile, cement, glass, and some textiles, produced at home under the protection of a significant tariff, find a ready market. These manufacturing interests, however, are chiefly small local concerns and cannot supply the market, which must depend almost entirely upon the importation of foreign goods.

FOODSTUFFS AND BEVERAGES

Although Uruguay is one of the most arable countries in the world, food products and beverages constitute the leading class of goods imported. They make up about 18 per cent of the total receipts. Like the food imports of Chile, they consist, with only one significant exception, of products which Uruguay cannot cultivate owing to climatic conditions. They include in order of value, sugar, potatoes, olive oil, yerba mate, coffee, rice, tea, and wines.

Sugar, the leading item in this class, amounts to one-third of the class, or to

5½ per cent of the total import trade. Cane sugar, for climatic reasons, cannot be produced in Uruguay while the lack of a labor supply and the climate have not favored the cultivation of the sugar beet. Consequently, sugar must be imported. About 80 per cent of all sugar consumed in Uruguay comes from the United States, the sugar preferred being the American white granulated. The remaining 20 per cent consists of beet sugar chiefly from Germany. With rising standards of living and an increase in the population the purchases of this commodity will increase.

Despite the fact that the second industry of Uruguay is crop production, Irish potatoes follow sugar in the list of imported foodstuffs. Potatoes occupy less than one-half of 1 per cent of the crop land of Uruguay, although climatic, soil, and relief conditions are not adverse to the growth of potatoes. They do not fit well into the dominant stock-farming industry. Most of them come only a short distance from Argentina, but France supplies small quantities; even the far-away United States has had a share in the business. While foreign purchases fluctuate greatly from year to year, the imports have decreased from 38,500 metric tons in 1920 to 14,160 tons in 1925. With an increased labor supply and the expansion of farming, the receipts of this bulky and perishable commodity will become less and finally may disappear from the import list.

Olive oil, a product for the most part of a climate markedly different from that of Uruguay, stands third or fourth in the list of foodstuffs. Practically all of this commodity comes from Mediterranean Europe (chiefly from Spain), the region which supplied the basal stock of Uruguay's population, a people already addicted to a generous use of this product.

Rice, although not grown in Uruguay, is consumed extensively throughout the country. The imports come chiefly from Brazil and Spain.

Among the beverages imported and consumed, yerba mate, or Paraguayan

tea, leads. What coffee is to the Scandinavian, yerba mate is to the Uruguayan in all the country districts. It is considered one of the necessities of life of the *campos*. For the common people it serves as the breakfast beverage, and at intervals during the day it strengthens the tie of friendship at social or business gatherings. In the country when a social or business call is made, the mate gourd filled with hot water for each person as passed from mouth to mouth bespeaks Uruguayan hospitality. It stimulates, and fortifies the body against cold, fatigue, and hunger; consequently the gourd filled with crushed mate leaves and a small pot for boiling water form part of the equipment of nearly every *gaucho* as he goes out on the range to tend the herds or flocks. Uncultivated in Uruguay for lack of favorable climatic conditions it enters the import trade to the amount of about one and one-half million dollars, or 2½ per cent of the total imports. With the spread of the habit of partaking of mate and an increase in the population the purchases of this commodity will increase, although coffee and tea may replace it in some districts among people of the upper classes.

Coffee imports amount to about one-third of the purchases of yerba mate; however, only one-tenth as much coffee is consumed as yerba mate. Nearly all of the product comes from Brazil. It enters the Urban districts chiefly for use by foreigners, recent immigrants, who have not become accustomed to yerba mate, and by upper class Uruguayans.

Tea from British India and Japan enters the import trade as one of the important beverages. In the cities it takes the place of mate as the afternoon tea. At five most of the stores, shops, and offices close, and the people gather at the tea rooms, luxuriously furnished and equipped with an orchestra. If a business man be too busy to leave the office, tea is served at his desk. After tea, stores and shops reopen and business continues. This widespread custom causes a large consumption of tea.

Wine vies with coffee for second place in value in the list of imported beverages, but in quantity it amounts to four times as much. Nearly all wine imports come from Spain, Argentina, France, and Italy; Spain supplies the major portion.

In addition to the preceding principal imports of this class, Uruguay buys in small quantities a great variety of foodstuffs from diverse regions. The more important ones include fresh grapes from Argentina, farina from Brazil, oranges from Paraguay and Brazil, dried fruits from Argentina and Chile, raisins from Spain and the United States, sardines in oil from Spain, and canned goods from the United States.

With the exception of potatoes, the major imported foodstuffs and beverages cannot be produced on Uruguayan soil. Consequently they will continue to enter the trade in significant amounts. A rising standard of living accompanied by a larger purchasing power, and an increase in population will swell the trade in many minor food products, both in amount and variety and increase the importance of this class of goods. On the other hand, the expansion of farming will eliminate some of the major imports, especially potatoes, and many of the minor ones, since relief, soil, and climatic conditions favor the production of such crops.

IRON AND STEEL PRODUCTS

The second class of goods in the import trade of Uruguay consists of iron and steel products which include automobiles, industrial and agricultural machinery, and a large variety of general iron and steel commodities. Since the country does not have the basic materials for manufacturing these products, local plants depending upon imported raw materials and fuel turn out a very minor part of the requirements. Consequently general prosperity in the country, a growing building industry, the expansion of agriculture, a road improvement program, and increased industrial activities create a rather active market for this

class of goods, which amounts to 15 per cent of the total imports.

Automobiles

Automobiles constitute almost one-third of the purchases of iron and steel goods, or 5 per cent of the total imports. The rapid increase during recent years in the number of automobiles purchased represents one of the most striking developments in Uruguayan trade. The receipts of automobiles and chassis in 1925 were 7,810. The motor car is beginning to replace the carriage in all the large cities, and the horse on the range. The betterment of living conditions, favorable financial conditions in the rural districts, and extensive road improvements increase the use of automobiles.

Within its small area, Uruguay has better roads than most South American countries. A well-developed system of highways penetrates a considerable distance inland from Montevideo. From the capital to Canelones, San José, Minas, Florida, and Atlantida, the roads are macadamized. As in Argentina during the dry season automobiles may traverse much of the range without great difficulties. However, nearly all the cars are in the southern part of the country.

As in other South American republics, the United States dominates the trade in automobiles; it supplies 97 per cent of the total. With the trade well established, excellent service, and the replacement of parts, American concerns should control the business. More than half the cars entering Uruguay consist of light makes. They can be used with more success than heavy cars on most of the roads or on the open range.

Motor truck transportation is little developed in Uruguay; even in the cities trucks are little used. In the country the ox-, mule-, or horse-drawn two-wheeled cart continues as the chief means of transport, other than the railways. The expansion of farming, road improvement, and a rising standard of living will

increase materially the use of the automobile throughout the country.

Industrial Machinery

Industrial and construction machinery follow automobiles in the list of iron and steel imports. Port improvements, railway and road construction, city development and the expansion of manufacturing industries account for the major receipts of this class of machinery. While a number of countries share in this trade, British goods lead, with those of Germany second, Argentina third (almost entirely reexports of foreign goods), and the United States fourth. The control of the trade in this class of commodities depends largely upon the nationality of the companies or concerns which get the bids for extensive construction or building programs, inasmuch as they depend upon the home country for machinery and supplies.

Agricultural Machinery

In spite of the small place farming plays in the export trade of Uruguay, agricultural implements constitute a significant item in the import trade, especially during recent years. The increase in the area devoted to wheat, oats, and flax (the area in wheat doubled between 1919 and 1925) accounts for the chief imports of farm implements. They included plows, harrows, drills, planters, harvesters, and tractors. Also, numerous small implements entered the farming districts. The United States supplies more than 50 per cent of the requirements.

In contrast to that in Argentina, the marketing of agricultural implements in Uruguay is not a specialized trade, but a side line of the leading hardware dealers. Only one branch house (American) has been established in the country. The machinery and hardware dealers do not give "service" facilities, a feature of the Argentine market.

A number of conditions point to an active market and increasing imports of agricultural machinery; the small output

of Uruguay for want of raw materials, power and labor, the small rural population making necessary the use of labor-saving machines, the level land and fertile friable soil free from stones and stumps, facilitating the use of machinery of all kinds, and the extension of the farming area, which most certainly will take place during the next decade.

General Iron and Steel Goods

In keeping with the major activities of the country the chief items in this group include (1) wire fencing, which encloses the vast stock ranges and the smaller crop lands; (2) iron bars, rods, sheets, pipes, and tubes for general construction purposes; (3) galvanized sheets chiefly for roofing; (4) steel rails for the upkeep of the railways; and (5) tin plates for the extract factories and the meat canning establishments. The United Kingdom has the largest share of the trade in these commodities as a group, while the United States, Belgium, and Germany supply practically all the remainder.

Without basic raw materials, power, labor, and capital for great industrial establishments and with continued expansion of agriculture, shipping, and construction, the market for iron and steel products will expand.

PETROLEUM PRODUCTS AND COAL

Uruguay mines no coal; it produces no petroleum. It cuts an insufficient supply of firewood from the meagre forest areas. Consequently, its packing plants, small manufacturing establishments, railways, steamships, and even the homes, for cooking (most homes in Uruguay are not heated), must depend on importations for fuel needs and for illuminating and lubricating oils.

Mineral oils and coal constitute respectively 12 and 6 per cent of the imports of the country; they cost the Republic about 12 million dollars per year. But they must come forward to keep in motion the chief export commodities of the country.

The mineral oils include a variety of products. Naphtha (benzine) and gaso-

line, both used for automotive purposes, amount to about 30 per cent of the purchases of mineral oils. Fuel oil, used extensively for ocean shipping, on the railways, and for industrial establishments, makes up almost 30 per cent of the oil imports. However, it is being replaced by coal on some railways and in factories, resulting in a decline of the receipts. Kerosene, the universal illuminating oil, accounts for 20 per cent of the total, and lights most of the homes of that small country where electricity has received little attention, except in a few cities. As in the petroleum imports of Argentina, the United States has the dominant posi-

consumption of coal is small and confined to cooking. Only occasionally is coal used for heating purposes, and then in small units as in fireplaces, salamanders, and similar stoves.

Uruguay will continue to import coal, and in increasing quantities as railways expand, as the range and the farms supply more products for the export movement, and as new factories develop.

TEXTILES

Textiles and textile manufactures make up about 7 per cent of the imports of Uruguay. They consist almost entirely of manufactured articles, although



FIGURE 8.—While the wool from the flocks of Uruguay supplies 35 per cent of the requirements for woollen textiles, most of the wool is exported to northwestern Europe and the United States, the chief textile manufacturing regions of the world. During the present century, as in most sheep countries, sheep have declined greatly in Uruguay, from 26 million in 1908 to 14 million in 1924; conditions causing this decline include serious droughts, overgrazing, improvement of cattle for high-priced meats, slaughtering sheep for mutton, and the uncertain wool market. (Courtesy of United States Dept. of Commerce.)

tion in those of Uruguay, supplying nearly four-fifths of the total. Mexico supplies nearly all the remainder.

In contrast to the petroleum products, coal comes largely from the United Kingdom, although in recent years the United States and Germany have furnished small quantities. Coal moves from England on low freight rates in tramp vessels en route to Uruguay or Argentina for bulky cargoes. Most of the coal imported by Uruguay is steam coal for the railroads and industrial plants. The railways are the principal consumers, followed by the Montevideo Gas Company. Domestic

twelve cotton factories, the smallest of which requires 13,000 pounds and the largest about 400,000 pounds, import ginned cotton. Domestic mills turn out about 10 per cent of the consumption of cotton goods and 35 per cent of the woollens (Fig. 8). The remainder of the requirements must be met by foreign purchases.

While the weather in Uruguay is never really cold, as the term is understood in the United States, heavy winter apparel, from underclothing to overcoats, is required, because few houses have heating appliances; persons often remain in

overcoats from the time of rising until going to bed at night. The damp, cool air of winter causes the cold to penetrate. Winter goods of heavy weights consist of flannels and other napped goods in somber colors. In summer the very sheerest of material—lawns, batistes, voiles, light serges, and worsteds—are worn. Thus, each season calls for distinct types of textiles.

Cotton textiles lead in the trade with almost one-third of the total. They include the whole run of cotton goods from the coarse cotton waste blankets and cheap split prints napped on the back, on one hand, to the flimsy, popular fancy colored voiles and batistes, on the other. The chief items include suitings, thread, sheetings (drill), piece goods, and hosiery. An active market exists for cotton goods in Uruguay since the country grows no cotton and manufactures only about 10 per cent of the consumption.

In the imports of textiles, woolen goods rank next to cotton, with about one-fourth of the total, in spite of a large clip of wool, and a well-advanced domestic woolen industry, which turns out one-third of the total requirements. In general, woolen goods are worn by men in both summer and winter, and by women chiefly in winter. The heavy weights of the fabrics used are due to the humid penetrating character of the cold of winter, and to the lack of heating appliances in houses.

The market for woollens is restricted to a few types of goods because domestic mills make cheap fabrics and coarse blankets that meet the needs and undersell imported articles. Imports consist chiefly of serges, combed worsted fabrics, tricotines, and flannels. An expansion of the home industry, under tariff protection, will give keener competition in the sale of woolen goods.

Silk goods constitute one-fifth of the textile imports. In proportion to its population when compared to other South American countries, the silk trade of Uruguay is large. It is well suited to

summer wear and within the buying power of a considerable portion of the people. In contrast the mass of people of Peru and Bolivia could not afford silk goods even if they would be comfortable in the cold highland regions; in tropical Brazil silk goods do not lie within the purchasing power of most of the people.

As in several other South American countries, jute cloth for wrapping or bags holds a significant place in the textile trade of Uruguay. It amounts in value to 12 per cent of the textiles, but in weight to more than all the others together. It is used in wrapping meat and wool and sacking grains. This cheap fabric plays an essential part in the movement of these commodities.

In the textile trade, as a whole, the United Kingdom leads with about two-fifths of the total. While it supplies all classes of cotton and woolen goods and fabrics of jute and linen, it dominates the trade in high-grade cotton and woollens, furnishing as much as four-fifths of the purchases. France ships silks, and mixed textiles of cotton, wool, and silk; the United States supplies the major part of the cotton yarns.

WOOD PRODUCTS

With only 3 per cent of the land of the country supporting a forest growth, and these areas in the more remote parts, Uruguay has to depend upon foreign regions for its requirements of forest products. These amount to about $3\frac{1}{2}$ per cent of the total imports, in spite of the fact that most buildings are made of adobe, stone, or cement. The imports consist mostly of pine lumber, box shooks, hardwood flooring, fence posts, and paper. They will be used in greater quantity as the country progresses.

OTHER IMPORTS

While a great variety of other commodities, amounting to more than one-third of the total receipts, are imported, few have special significance. Tobacco amounts to $1\frac{1}{2}$ per cent of the foreign purchases. Uruguayans, like most

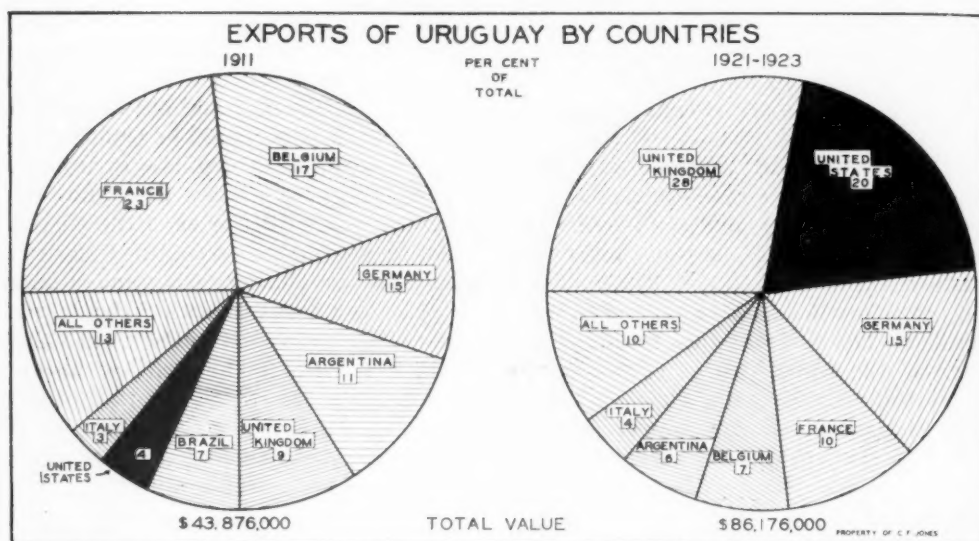


FIGURE 9.—The exports of Uruguay, raw materials and foodstuffs, go almost entirely to western Europe and the United States. In taking Uruguayan products the United Kingdom and the United States show striking increases since 1911. Germany, after complete disorganization of trade during the war, holds its pre-war rank.

South Americans, are inveterate smokers, but they grow little tobacco. Pure-bred cattle account for 1 per cent of the imports and are a prime factor in the development of the cattle industry of the country. Numerous commodities pur-

chased in small quantities indicate the many needs of a growing country.

TRADE BY COUNTRIES

While many countries share in the commerce of Uruguay, three regions take

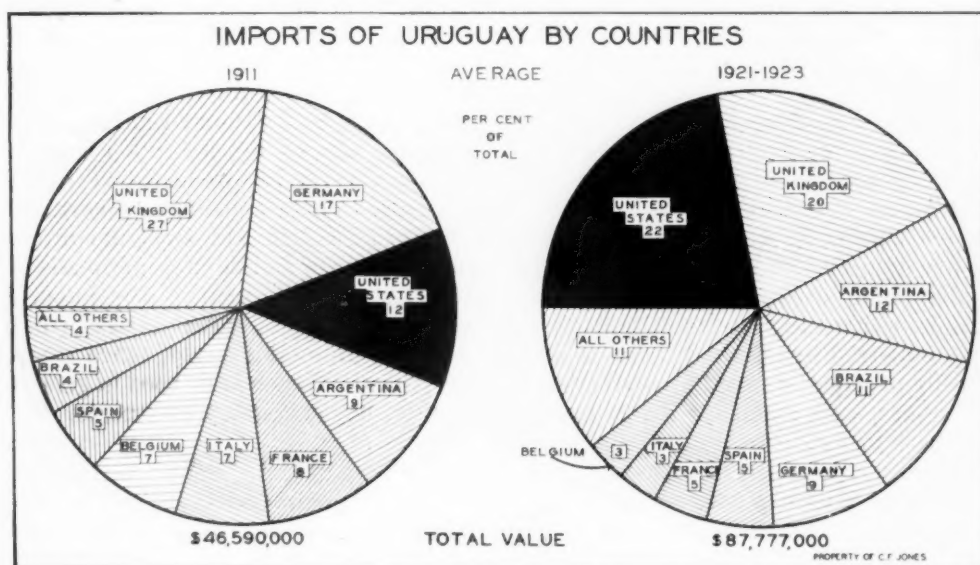


FIGURE 10.—The most remarkable change in the import trade of Uruguay since 1911 has been the gain of the United States from 12 per cent in that year to 22 per cent in 1921-1923 and to 26.3 in 1925. The high rank of Argentina results chiefly from reexports of a variety of goods originating in the manufacturing regions of western Europe and the United States.

all the exports and supply practically all the imports. They include western Europe, the United States, and neighbor republics of eastern South America.

WESTERN EUROPE

Western Europe, embracing all the countries west of Poland and Austria, buys (average 1924-1925) 75 per cent of the exports and supplies 50 per cent of Uruguay's foreign purchases. In fact, four countries—the United Kingdom, Germany, France, and Belgium, representing the heart of that region—take 63 per cent of the exports and furnish almost 40 per cent of the imports (average 1924-1925). Strong natural bases for exchange of goods exist between these nations and the little Republic of Uruguay. They are industrialized countries depending upon foreign regions for raw materials and foodstuffs and a market for their wares. Uruguay, on the other hand, supplies foodstuffs and raw materials and buys its manufactured commodities.

The United Kingdom

The United Kingdom has long been the leading nation in the commerce of Uruguay. It takes more than one-fourth of the exports and supplies one-fifth of the imports (Figs. 9 and 10). When the colonial power of Spain waned and was broken, the British first entered the commercial field of Uruguay. British men and money have penetrated every phase of the economic life of the Republic. They have constructed and managed railways, built factories, improved the flocks and herds, established banks, provided ocean shipping facilities, and furnished goods and equipment for all this development work. British investments in this small country total 225 million dollars; British-owned railways alone represent about one-third of the total. Yet while men and money form economic pillars of exchange with Uruguay, the natural resources constitute the solid bases upon which the trade has been built.

The United Kingdom, a nation of

restricted agricultural lands, scores of great manufacturing plants, rich coal deposits, hungry millions of factory workers, and a great merchant marine looks to oversea regions for foodstuffs and raw materials. Uruguay, without the bases for manufacturing development and with extensive grazing lands and fertile soils, forms a trade complement to the United Kingdom. Also, that nation far outstrips any other country in the *sea-carrying trade* of Uruguay; it has 40 per cent of the ships and 42 per cent of the net tonnage of ocean shipping at Uruguayan ports.

The United Kingdom is the chief market for Uruguayan chilled beef, mutton, hides and skins, and wool, the major exports; it leads all countries in supplying coal, cotton textiles, woolens, yarns, iron and steel bars and sheets, and industrial machinery. Yet in the face of these conditions the United Kingdom furnishes a smaller part of the imports than before the war. From 1900 to 1913 British goods accounted for 27.5 per cent of the total purchases, but from 1914 to 1925 they have averaged only 18.5; the figure for 1925 was 17.7. However, this relative decline may not be considered permanent, because British merchandise, on account of liberal credits, extensive shipping facilities, cheap ocean freights, heavy purchases of Uruguay's export products, and the traditional custom of South American merchants to buy from those in whom confidence and friendship repose, enjoys special advantages in the market. Furthermore, no stronger natural trade bond exists between Uruguay and any other country than that between Uruguay and the United Kingdom (Fig. 11).

Germany

From 1900 to 1912 Germany held a strong position in Uruguayan commerce; it was one of the chief markets for the exports and supplied 15 per cent of the imports. While the trade was completely demoralized during the war, the country has almost regained its pre-war rank. In 1925 it took 15.6 per cent of



FIGURE 11.—The introduction of pure-bred cattle has been a prime factor in the evolution of the meat trade in jerked beef and extract of the old days to frozen and chilled beef of today. Greater improvement and better finishing methods will cause more of the stock to be dressed into chilled beef for choice markets. As in Argentina, the British have had a good part in the improvement of the herds. (Courtesy of Pan American Union.)

the surplus products of Uruguay, having surpassed the United States in 1924 as the second consumer (Fig. 5), and furnished 11.5 per cent of the foreign purchases.

Natural bases favor the commerce between these two countries, the one a manufacturing nation and the other a producer of raw materials and foodstuffs in abundance. In addition, this trade recovery has been aided by low prices, long-term credits, cheap ocean transportation, and an accurate study of the market conditions under which representatives of German firms have to operate. These same conditions will advance German trade still more at the expense of competitors. Germany is a good market for most of Uruguay's exports, and holds first place in furnishing dyes and colors, paper, and musical instruments; second place in iron and steel products in general, agricultural machinery, industrial machinery, and coal.

France

During the past two years France, as a consumer of the exports of Uruguay, passed the United States; it now holds third place. Most of the surplus commodities of the Republic find a ready

market in France. French commodities to Uruguay consist of products peculiar to France, especially fine quality silk goods, mixed textiles, perfumery, toilet preparations, and fine wines. All these goods are well established in Uruguay; only a price-basis competition on articles of equivalent or better quality can displace them in Uruguayan markets. As in Argentina and Chile, France dominates the trade in these lines, and stands in a good position to hold that place.

THE UNITED STATES

Of all the countries sharing Uruguayan trade the United States has made the most remarkable advance since 1910. It has moved forward in the exports from 4 per cent of the total in 1911 to 20 per cent in 1921-1923; in 1925 the figure was only 12 per cent, the United States having been surpassed by Germany; however, if the Uruguayan products reexported from Argentina to the United States be included the figure is 17, giving the United States second place. It advanced in shipments to that country from 12 per cent of the total in 1911 to 22 in 1921-1923, and to 26.3 in 1925.

While a considerable part of this com-

mercial growth may have resulted from the unsettled conditions of trade and shipping of the war period, more fundamental bases exist. In the first place United States' factories need some of the raw materials which Uruguay has for sale. These include wool, of which 30,200,000 pounds came to the United States in 1925, hides, furs, fertilizer materials, and linseed. In the second place manufacturing interests have developed foreign trade far beyond the stage which existed before the war. The United States furnishes 80 per cent of the sugar, the largest single item in the import trade, 80 per cent of the petroleum products, 97 per cent of the automobiles, one-half the agricultural machinery and implements, a considerable share of the other iron and steel products, and nearly all the lumber.

A prime factor in this remarkable commercial expansion has been the increased activity of Americans in the economic life of the country, and large investments in banks, meat-packing establishments, and other enterprises. The total amounts to 45 million dollars, or almost one-fifth of that of the British; this is significant considering the fact that Americans entered the field only recently. Yet in order to hold its place in the trade, the United States must study the market, cultivate the Uruguayan importer, supply good quality merchandise at the most reasonable prices, combined with quick delivery, because the geographic bonds of interchange between Uruguay and the countries of western Europe are stronger at present than those between the United States and Uruguay.

NEIGHBOR REPUBLICS

Argentina and Brazil, the only two republics which have a significant share in the commerce of their common buffer state of the past, hold a peculiar relationship in the trade.

Argentina

Argentina, a country with similar lines of development supplying the same

export commodities as Uruguay and requiring the same manufactured wares, has credited to it 10 per cent of the imports of Uruguay and about 9 per cent of the exports (1925). It occupies a strategic position in the commerce of the countries of the Rio de la Plata region; its chief port, Buenos Aires, serves as an entrepôt for the distribution of goods destined for Uruguayan consumption. Consequently, many imports, credited to Argentina, originated in the industrial regions of northwestern Europe or in the United States. In the following lines of merchandise, Argentina is listed as holding second, third, or fourth place, whereas in reality all the shipments represent reëxports; steel rails, iron hoops, agricultural implements, industrial machinery, cotton textiles, paints, and oranges and yerba mate, the latter two from Paraguay. Likewise some of the shipments from Uruguay to Argentina are for reëxport.

On the other hand, Argentina supplies several commodities for consumption in Uruguay. Among these are potatoes, one of the large imports, wine, fresh grapes, raisins, and other food products, as a result not so much of a difference in geographic conditions, as a difference in the stage of development of the agriculture in the two countries.

Brazil

In contrast to the trade of Argentina with Uruguay, that of Brazil with its southern neighbor represents a response to differences in climate. Brazil leads in furnishing coffee, yerba mate, rice, farina, fresh fruits, and leaf tobacco—commodities not grown in Uruguay. In return Brazil takes "jerked beef," live cattle across the southern border of Rio Grande do Sul for breeding purposes, and flour. With the continued development of the two countries this trade should increase.

TRADE EVOLUTION

The commerce of Uruguay reflects the whole economic status of the Republic. It has been strikingly dominated from

early times by a single industry. The animal industries have contributed, until recently, more than nine-tenths of the export commodities and have contributed to the purchase of most of the imports. Along pastoral and *agricultural lines* the future of the country lies (Fig. 12).

For significant manufacturing developments the country is peculiarly handicapped. It has no coal, no petroleum, no minerals for a basic iron and steel industry, meagre forest resources, little water power, and few other raw materials for large factory establishments. Manu-

lands Uruguay depends for its commercial prestige. While the animal industry has dominated the trade of Uruguay for centuries, the evolution in the products of the range, from wool, hides, tallow, and *tasajo* of the old days to frozen beef, chilled beef, canned beef, frozen mutton, wool, and hides of today, accounts for the rapid growth of commerce during the past 25 years. This progress will continue in spite of the fact that Uruguay does not have vast areas of ungrazed lands, like Argentina. Although the total number of meat animals may not be increased greatly, some increase may



FIGURE 12.—A ranch scene in southern Uruguay. The pastures of Uruguay have contributed nearly all the exports of the country for centuries, while farms have supplied less than 5 per cent, until recently. With a favorable climate, fertile soil, and level to rolling lands, the huge ranches of former years must give way as crop production expands with the natural evolution of the agriculture of the Republic. (Courtesy of the United States Dept. of Commerce.)

facturing in Uruguay consists chiefly in the preparation of the products of the range and the farm for export and for local use or the making of cement, brick, glass, and furniture for domestic consumption. Consequently, Uruguay seems destined, for a long time, to continue in the channel it has pursued in the past—an exchange of raw materials and foodstuffs for manufactured wares.

On the other hand, from the standpoint of arable land Uruguay is one of the most usable countries in all the world. Cattle ranches, farms, and mixed cattle ranches—farms contain 87 per cent of the total area. On these

come by the extension of forage crops, fenced ranges, and better grazing methods. A marked improvement in the grade of animals, resulting from the eradication of the tick in the northern half of the country, the elimination of the hoof-and-mouth disease, importation of pure-bred stock, better breeding methods, and the constant demand in Europe for high-grade meats will increase greatly the shipment of chilled and frozen beef, which will add materially to the value of the export commodities.

A greater evolution, however, will take place along another line. Until recently farm products have contributed less than

5 per cent of the exports; in 1925 they supplied 10 per cent. Some of the agricultural commodities imported have decreased. With only $4\frac{1}{2}$ per cent of the land under cultivation, a rapid influx of immigrants (they have already begun to arrive and the government is making room for them), and an active demand in

the world marts for farm products, crop production will sweep like a great wave across the pastoral domain of former years, and will multiply in volume and value the trade of the country. Uruguay, in the evolution of its agriculture and its trade, stands upon the threshold of a period of great expansion.

THE PHILIPPINE COCONUT INDUSTRY

Luis J. Borja

COCONUT oil including copra, the dried coconut meat from which the oil is derived, today stands at the head of the list of imports of fats and oils into the United States. The average annual consumption of coconut oil of the United States in 1919-1923 amounted to about 327,356,000 pounds, of which 211,073,000 pounds, 97,232,000 pounds, and 19,050,000 pounds, respectively, were used in the manufacture of soap, oleomargarine, and lard compounds.

As a soap stock coconut oil is highly valuable for it has the following chemical characteristics:

(1) It is readily saponifiable, that is, cold process soap may be made from this oil.

(2) It contains a relatively high percentage of glycerine.

est butter-exporting countries of Europe, the consumption of oleomargarine largely made from coconut oil exceeds by wide margin the consumption of butter in these countries.

Because of the great importance of coconut oil as an article of food and industrial raw material, it may be of interest, therefore, to make a geographic and economic survey of the coconut industry in the Philippine Islands where about one-third of the world's supply of copra is produced.

CLIMATIC FACTORS IN THE PHILIPPINE COCONUT INDUSTRY

Largely because of the high mountain ranges running longitudinally in the interior of most of the largest Islands, the

CHEMICAL STRUCTURES OF BUTTER, COCONUT AND COTTONSEED OILS¹

	<i>Butter</i>	<i>Coconut Oil</i>	<i>Cottonseed Oil</i>
Specific gravity at 100° C.....	0.868	0.873	0.873
Solidifying point, in degrees centigrade.....	20-23	22-23	3-4
Saponification value.....	227	256	192
Iodine value.....	30	9	106
Reichert value.....	14	3.7	.....
Reichert Meissl value.....	21.6-33.2	8.0	.....
Refractive index at 60° C.....	1.445	1.441	1.457

¹ All constants are for refined oil as published by Lewkowitsch in "Oils, Fats and Waxes."

(3) It is the only oil that will make "marine soap"—soap which lathers in salt water.

(4) It is one of the few oils which form "soft soap" with caustic soda.

The chemical structures of butter and coconut oil are as follows. Cottonseed oil is also included to show a wide variation between this and the other two oils.

It may be noted that the chemical structure of coconut oil closely approximates butterfat, and is, therefore, used in the manufacture of oleomargarine. In the Netherlands and Denmark, the great-

rainfall in some portions of the Archipelago is heavier than in others, and the periods of the rainfall are different. On the basis of intensity and time of rainfall, the Philippines may be divided into three distinct climatic areas, namely A, B, and C (Fig. 1).

In Area A, the wet and the dry seasons are sharply defined. The wet season generally starts about June 15 and continues to about December 1, and a very dry season prevails during the rest of the year. During the dry season from December to May in 1915, 1916, and 1918, there were on the average only 35 rainy

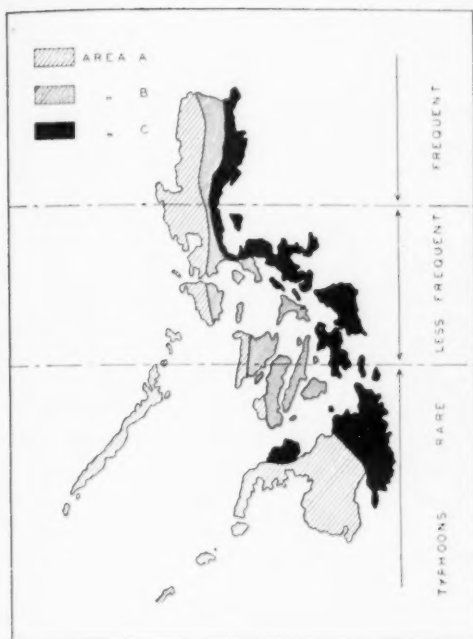


FIGURE 1.—The relative frequency of typhoons in the several parts of the Philippines is clearly brought out by this chart as are the rainfall relationships. In area A, the wet and dry regions are sharply defined, the rainy season lasting from June 15 to December 1; in area B the rainy season extends over most of the year (except March and April); and in area C the rainfall is heavy throughout the year.

days, with a total rainfall of only 369.4 millimeters.

The coconut palm needs a considerable amount of water and the factors, therefore, that increase its transpiration are injurious to the tree unless enough water can be supplied by the roots. For this reason, the comparatively long period of hot sunny weather and the strong and constant wind prevailing during the dry season in the western part of the Philippines cause the coconut tree to lose much of its water and render it less productive.

Table I shows the average climatic conditions prevailing in the section designated as Area A on the map (Fig. 1).

Climatic conditions in Area B are different from those of Area A. Area B is the transition zone between the western part of the Islands where dryness prevails during half of the year and the

eastern part characterized by its humid climate practically all the year around. The rainy season in Area B generally extends over the major portion of the year, the dry season being limited to the months of March and April. In the period corresponding to the dry season in Area A, the average total rainfall in Area B in 1915, 1916, and 1918 amounted to 497.8 millimeters as compared with only 369.4 millimeters in Area A.

Table II shows average climatic conditions prevailing in the section designated as Area B.

The Island of Samar and Leyte and the Pacific Coast of Luzon and Mindanao comprise a third climatic area known as Area C (Fig. 1), where the rainfall is exceptionally heavy and uniformly distributed over the entire year. The dry season is not sharply defined in this region and the average temperature is somewhat lower than in the two other areas described. Area C is also char-

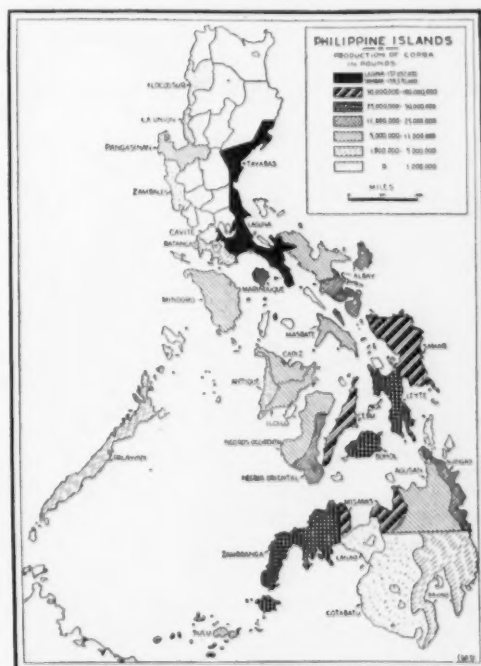


FIGURE 2.—Copra constitutes one of the most important products of the islands. The distribution of the production seems to be concentrated in climatic areas B and C of Figure 1. (Courtesy of U. S. Dept. of Commerce.)

TABLE I.—AVERAGE CLIMATIC CONDITIONS IN AREA A²

Items	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Temperature °C.													
mean monthly	25.4	25.9	27.1	28.5	28.8	28.2	27.6	27.1	27.2	27.3	26.9	26.2	
Warmest month	31.1	32.1	33.8	35.7	35.6	34.8	33.0	32.0	32.4	34.4	32.9	32.1	
Coollest month	20.7	21.0	22.1	23.6	24.1	24.1	24.1	24.0	24.1	23.8	22.5	21.8	
Highest	34.1	35.6	36.7	37.9	37.5	37.9	36.0	34.8	34.9	34.7	34.9	34.7	
Lowest	17.7	18.0	20.1	22.3	22.8	22.1	22.8	22.6	22.5	22.3	19.8	18.4	
Humidity, relative													
per cent.	73.4	73.9	73.8	71.9	75.2	80.2	83.1	85.9	85.4	82.6	78.5	77.3	
Days with rain, number	2	3	3	7	13	19	22	25	22	17	6	4	145
Rainfall, mm.	4.7	29.2	29.6	130.6	157.0	246.3	414.7	535.2	437.7	185.8	78.7	18.9	2,268.4

² Record covers three year average, 1915, 1916, and 1918. From official figures of the Philippine Weather Bureau.

acterized by its comparatively high atmospheric humidity and cloudy days during the greater part of the year.

Table III shows the average climatic conditions in the section designated as Area C.

Broadly speaking, the thriving coconut industry in the Philippines is found in the Areas B and C where the rainfall is more or less evenly distributed over the entire year, and in these areas the ideal coconut cultivations are further limited to the regions less frequently visited by destructive typhoons (Fig. 2). Very severe storms weaken the trees and set them back materially by breaking the leaves, and they often destroy a con-

apparently of greater importance than soil structure and composition in determining the ideal site for coconut cultivation. In these regions prolific coconut plantations are found on many different kinds of soil and it is quite usual to find a thriving coconut grove on the sandy seashore. This is due to the higher country back of the seashore; the rain which falls on this highland sinks into the soil and then moves in the soil toward the sea, carrying with it plant food which it dissolves as it moves. In times of drought the amount of such water naturally decreases, but the seashore itself, being the place where the water necessarily comes close to the surface of

TABLE II.—AVERAGE CLIMATIC CONDITIONS IN AREA B³

Items	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Temperature °C.													
mean monthly	25.4	25.8	26.8	27.9	27.8	27.3	27.3	27.3	27.0	26.8	26.7	26.1	
Warmest month	28.8	31.2	31.1	32.0	32.1	31.3	30.8	30.6	30.6	30.6	30.7	29.8	
Coollest month	22.7	22.5	23.4	24.3	24.5	24.2	24.1	24.3	24.1	24.0	23.8	23.4	
Highest	30.9	32.7	33.3	33.9	34.1	33.7	32.5	32.2	32.4	32.5	32.5	31.3	
Lowest	20.8	19.9	21.8	22.2	22.9	22.4	22.4	22.2	22.2	23.0	22.4	21.3	
Humidity, relative													
per cent.	81.4	76.3	74.3	71.7	78.3	81.1	82.3	81.1	82.6	84.4	83.2	83.5	
Days with rain	13	6	5	4	12	17	17	17	15	21	14	14	155
Rainfall, mm.	88.2	89.2	35.9	25.1	145.8	392.4	351.2	222.8	253.7	316.3	118.1	113.6	2,152.3

³ Record covers 3 year average, 1915, 1916, and 1918. From official figures of the Philippine Weather Bureau.

siderable part of the crop by throwing down immature nuts. Moreover, in places where beetles, especially coconut weevils, are a serious pest, violent storms furnish condition for their entrance and multiplication in the trees.

LOCALIZATION OF COCONUT PLANTATIONS IN AREAS B AND C

Within the Areas B and C, where climatic conditions are very favorable, topography and ground water table are

the ground, is the last place to suffer from the scarcity of it. So long as there is enough water in the soil back of the beach to permit it to move through the ground, the seashore itself will contain ample available fresh water.

Since it is the moving water in the ground which is responsible for the high development of coconut plantations at the seashore, it follows that other situations which likewise have constant moving water in the soil furnish excellent con-

TABLE III.—AVERAGE CLIMATIC CONDITIONS IN AREA C⁴

Items	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Temperature °C.													
mean monthly	25.3	25.6	26.3	27.1	27.6	27.0	27.9	27.5	27.1	27.1	26.6	25.9	
Warmest month	28.7	30.1	30.5	31.7	32.1	31.6	31.6	31.5	31.3	31.3	31.1	29.5	
Coolest month	23.1	21.9	23.2	23.8	24.1	24.1	24.9	24.4	24.3	24.1	23.4	23.3	
Highest	31.9	32.4	32.7	33.5	34.0	33.3	33.9	33.3	34.0	33.8	33.2	31.9	
Lowest	20.9	17.5	20.1	20.9	21.9	22.4	22.5	22.6	22.3	22.7	21.0	21.1	
Humidity, relative													
per cent.	84.9	81.4	80.7	80.7	82.6	83.4	81.5	82.1	84.1	84.6	84.1	85.8	
Days with rain	25	14	15	14	16	21	14	16	20	20	22	23	218
Rainfall, mm.	408.2	184.4	196.2	114.7	233.8	307.3	174.3	213.5	259.1	293.3	285.0	439.9	3,109.7

⁴ Record covers 3 year average, 1915, 1916 and 1918. From official figures of the Philippine Weather Bureau.

dition for coconut culture. Thus plains sloping upward from the sea, even for great distance, are good coconut regions so long as there is higher ground back of them from which they can derive a constant supply of soil water. Therefore, the region around the base of a mountain, whether near or far removed from it, is a good coconut country.

One of the largest coconut areas in the world is situated at the foot of Mt. Banahao, an extinct volcano in Laguna Province. This is perhaps the best coconut region in the archipelago because the rain which falls upon the porous soil of Mt. Banahao sinks readily into the volcano and comes back to the surface at

lower levels well-charged with dissolved plant food.

RELATION OF COCONUTS TO OTHER CROPS

The southeastern part of the Philippines is practically the only ideal region in the world for growing abaca plant (Manila hemp), and it is in this area where coconuts and abaca compete for the use of the land. Abaca has been one of the foremost commercial crops of the Islands since early Spanish colonial times. In 1924 the total value of abaca fiber exported from the Islands amounted to about \$30,000,000.

Owing to the scarcity of labor needed



FIGURE 3.—An old coconut grove in Laguna Province. The trees were planted without regard to proper spacing. (Courtesy of U. S. Bureau of Insular Affairs.)



FIGURE 4.—A young coconut grove in Zamboanga Province. Note how the trees are properly spaced. (Courtesy of U. S. Bureau of Insular Affairs.)

in the abaca industry, there has been in recent years a tendency to decrease the acreage devoted to abaca growing. In the three years, 1920-1921 to 1922-1923, the abaca area lost 21 per cent in favor of other crops, especially coconuts.

In the new coconut plantations it has been a common practice to mix coconuts and abaca. The abaca is expected to begin to yield returns during the third year and continue to do so up to the tenth year. It is believed that in about ten years the coconuts will come into full bearing and the abaca will be worn out.

METHODS OF PRODUCTION

The nuts are ready to be used for seed at the same time that they are ready to be used for copra. This condition can be recognized by the heaviness of the nut and by the noise the water in the interior cavity makes when shaken. The coconuts are placed in the seedbed to germinate before they are set out in the

field. It is desirable to choose for seedbed a well-drained and shaded ground and where water is easily available for sprinkling. Precautions should be taken to protect the seedbed from any danger of white ants and to enclose it with fence to keep off larger enemies. It is a common practice to postpone transplanting until the shoots are about 30 centimeters high, but before the seedlings have developed a root system.

The first thing to be done before transplanting is to line off the ground, marking accurately the spot for each tree. The regular arrangements and proper spacing of trees in the field is a matter of very considerable permanent importance. The coconuts ten meters apart are considered properly spaced because at this distance the trees do not crowd each other and are enabled to receive the maximum amount of sunlight.

The effect of sunlight on the productivity of coconuts may be illustrated by the records made by Mr. E. B. Cope-



FIGURE 5.—Prolific young coconut. (Courtesy of U. S. Bureau of Insular Affairs.)



FIGURE 6.—Tied in circular rafts, coconuts are floated down the river to the copra factory. (Courtesy of U. S. Bureau of Insular Affairs.)

land, formerly dean of the Philippine College of Agriculture. He reported that at San Ramon Plantation on the Island of Mindanao the coconut trees in rows on each side of a narrow road yielded at one cutting an average of 22 nuts per tree. In this plantation nuts are cut four times a year. A single row of trees along the well-drained bank of a slough yielded an average of 27 nuts. An isolated tree in the open yielded 55 nuts, this being the average for this tree for several successive cuttings. In the center of an old grove, the average for the producing trees was only 11.

After the seedlings are transplanted, catch crops, such as corn, beans, and upland rice, may be grown in the young grove if sufficient labor is available and market conditions favorable. Catch crops may bring returns above the cost of producing them, including the cost of fertilizer required to replace the plant food which the catch crops have taken from the soil.

The young coconut starts to bear fruit at the age of six and continues in bearing for 30 to 40 years. The proper time to harvest the nuts depends mostly on the use to be made of the crop. For making copra, the best way to harvest the nuts is to permit them to ripen fully on the tree until they fall. In the Philippines, however, the nuts are often cut down and

the unripe nuts produce less copra of inferior quality.

RECENT DEVELOPMENT IN THE PHILIPPINE COCONUT INDUSTRY

There is in recent years a tendency in the Philippines to a more stabilized production of copra with the use of modern and more efficient cultural methods. During the early days of coconut cultivation, the plants were often planted in any available clear space and in some cases the nuts were allowed

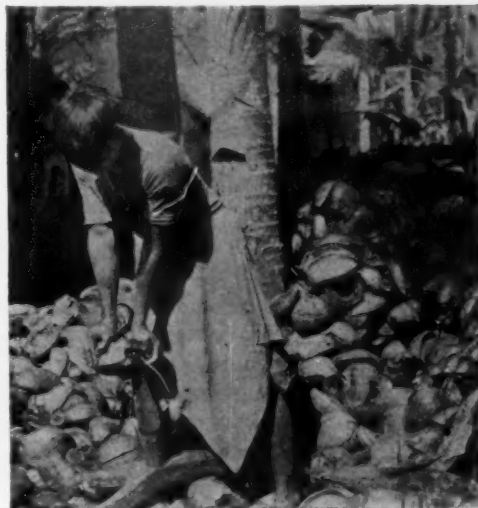


FIGURE 7.—Husking coconuts in Laguna Province. (Courtesy of U. S. Bureau of Insular Affairs.)

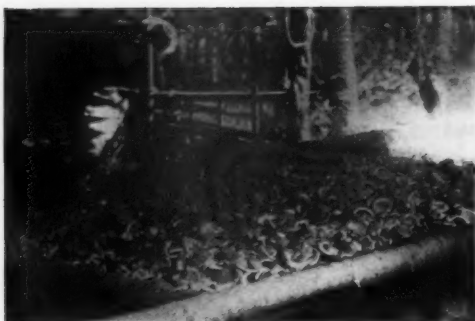


FIGURE 8.—Tapahan system of drying copra. (Courtesy of U. S. Bureau of Insular Affairs.)

to sprout where they fell without regard to proper spacing. No provision was made for cultivation or irrigation, nor was there any effort to increase the production of nuts per acre by modern agricultural methods. These conditions have now been changed in some areas through campaigns carried on by the government agencies. Plantations have been thinned out, thereby increasing the yield per acre. This is particularly true in the case of new coconut plantations, most of which have been set out in the past ten years on the Island of Mindanao (Fig. 4). One of the most important areas in this island is the province of Davao, where destructive typhoons practically never occur. It is reported that in this province a little more than one hundred new companies are engaged in coconut production. Some of these plantations are now in bearing and it has been reported that the average yearly production per tree is over two hundred nuts as compared with only about sixty nuts per tree for the entire archipelago.

Another important region in the Island of Mindanao is the province of Zamboanga. This province has made rapid progress in the development of coconut plantations. In addition to Zamboanga, the province of Misamis on the north coast of the Island has also advanced rapidly and now it ranks third among the most important copra-producing provinces, the first two being Laguna and

Tayabas on the Island of Luzon. It may be noted that these new coconut plantations in Mindanao are becoming an important factor in the copra export trade of the Philippines.

COPRA DRYING IN THE ISLANDS

In the Philippines, where the climate permits, copra is dried in the sun. However, in the chief coconut-producing provinces, the sky is so overcast and rains are so frequent that sun drying is out of the question. Here the coconut meat is dried in the "tapahan" (Fig. 8) which is an oblong pit on the top of which is built a grill of bamboo, leaving one end of the pit open, at the bottom of which fire is made. The raw coconut meat is placed on the grill through which the hot air and smoke pass to dry the copra. This process is unsatisfactory, because the copra made in this way is commonly insufficiently and unevenly dried and becomes discolored from the smoke. There has been in recent years, however, a gradual improvement in drying copra artificially in the Islands (Fig. 9).

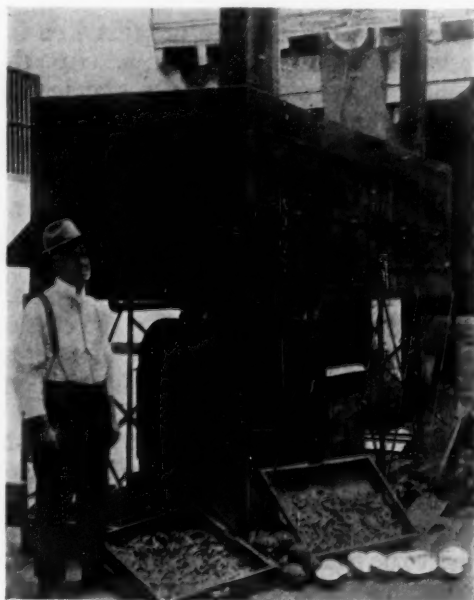


FIGURE 9.—Modern hot air system of drying copra. (Courtesy of U. S. Bureau of Insular Affairs.)



FIGURE 10.—Copra in bags, ready for export. (Courtesy of U. S. Bureau of Insular Affairs.)

TREND OF PRODUCTION AND EXPORTATION OF COPRA AND COCONUT OIL FROM THE PHILIPPINES

The production of copra has been an industry of rapidly increasing importance in the Philippine Islands in the last fifteen years. The average annual production, which amounted to only 278,000,000 pounds in 1910-1913, has increased to an average of 808,000,000 pounds in 1921-1924. In 1925, however, due to severe drought all over the Island, the production

of copra in the Philippines, according to commercial reports, was smaller than that of the record year, 1924, when 851,000,000 pounds were produced. Moreover, in the first three months of 1926, production of copra was about 20 per cent below that of the corresponding period in 1925, according to O. M. Butler, American Trade Commissioner at Manila.

PHILIPPINES.—NUMBER OF COCONUT TREES AND PRODUCTION OF COPRA, AVERAGE 1910-1913, ANNUAL 1920 TO 1924^a

Year	Trees (Number)	Production of Copra (Pounds)
Average 1910-1913.....	41,328,115	277,831,987
1920.....	79,406,100	762,258,276
1921.....	83,591,900	789,697,590
1922.....	84,536,710	773,227,336
1923.....	86,707,380	809,014,750
1924.....	87,460,000	850,561,850

^a Compiled from the annual report of the Philippine Bureau of Agriculture, 1910-1924.

Although the exports of copra have not kept pace with increased production of this commodity, the shipment of coconut oil, the principal product derived from copra, has advanced materially since 1913. This is due to the scarcity of tonnage during the war which made it profitable to ship oil instead of copra and stimulated the coconut oil industry in the Islands.

While the average annual shipments

COPRA AND COCONUT OIL.—EXPORTS FROM THE PHILIPPINES, AVERAGE 1910-1914, ANNUAL 1920 TO 1925^a

Country to Which Exported	Average 1910-14 (1,000 Pounds)	1920 (1,000 Pounds)	1921 (1,000 Pounds)	1922 (1,000 Pounds)	1923 (1,000 Pounds)	1924 (1,000 Pounds)	^b 1925 (1,000 Pounds)
Copra:							
United States ^c		3,160	116,686	196,999	284,963	237,054	284,059
Netherlands.....		28,645	67,932	59,385	43,483	10,182	.....
France.....			49,854	21,991	38,598	17,364	.....
Spain.....		3,580	4,239	21,028	36,217	34,166	.....
United Kingdom.....		6,088	13,090	19,729	22,727	25,779	.....
Germany.....		13,455	66,463	58,447	25,137	18,634	.....
Other countries.....		1,957	13,165	3,931	5,517	2,416	39,381
Total.....	* 253,524	56,885	331,429	381,510	456,642	345,625	323,440
Coconut Oil:							
United States ^c		158,610	177,480	235,110	186,836	243,734	.....
Netherlands.....		11,833	16,994	.....	.....	.....	.....
United Kingdom.....		2	3,080	.....	8,705	.....	.....
Other countries.....		569	1,504	1,241	1,073	2,363	.....
Total.....	* 7,476	171,014	199,058	236,351	196,614	246,097	229,560

^a Compiled from annual report of the Insular Collector of Customs, 1910-1924.

^b Including Guam and Hawaii.

^c Total—all countries.

^d Preliminary. Compiled from the American Chamber of Commerce Journal, Manila, P. I.

of copra increased from 255,523,859 pounds in 1910-1914 to 367,723,790 pounds in 1921-1925, an increase of 44 per cent, the exports of coconut oil have increased from only 1,455 pounds in 1912 to 246,096,859 pounds in 1924. In the last three years, about 80 per cent of the copra and 99 per cent of the coconut oil imported into the United States have come from the Philippines.

In 1922 the world's total export trade in copra, including coconut oil converted to terms of copra,¹⁰ amounted to 2,478,-

from the Philippines was 575,758,000 pounds or 288 per cent, showing that the increase in exports from the islands was far greater relatively than the world increase.

Prior to 1912 exports of coconut oil from the Philippines were insignificant. Since then, however, the shipments of coconut oil rose so rapidly that the Islands ranked third in 1913 and first in 1922 among the coconut oil exporting countries. In 1922 the exports of this product from other copra-producing countries, except India, Ceylon, and Straits Settlements, had

COPRA AND COCONUT OIL.—EXPORTS FROM PRINCIPAL PRODUCING COUNTRIES, 1913, AND 1922 TO 1924¹¹

Country	1913		1922		1923		1924	
	Copra ¹²	Coconut Oil ¹³	Copra	Coconut Oil	Copra	Coconut Oil	Copra	Coconut Oil
	(1,000 Pounds)	(1,000 Pounds)	(1,000 Pounds)	(1,000 Pounds)	(1,000 Pounds)	(1,000 Pounds)	(1,000 Pounds)	(1,000 Pounds)
Dutch East Indies	504,177	¹³ 8,209	¹² 748,383	¹² 3,652	706,270	2,916	757,687	15,377
Ceylon	124,279	61,257	¹² 188,898	¹² 62,118	113,732	53,820	198,149	61,895
Philippines	181,261	11,049	381,510	236,351	456,642	196,613	345,597	246,097
British India	85,508	7,954	¹² 2,652	¹² 7,441	8,913	1,873	1,850	886
Straits Settlements	26,004	13,320	¹² 224,735	¹² 8,525	344,544	21,241	347,376	22,422
Total	921,229	85,278	1,546,178	318,087	1,630,101	276,463	1,650,659	346,676
World Total	1,123,141		1,845,348	319,747				

¹¹ Compiled from official sources.

¹² Net exports.

¹³ Net imports.

260,000 pounds as compared with 1,260,-611,000 pounds in 1913, an increase of 1,117,649,000 pounds or 89 per cent. In the corresponding period the increase in exports of copra including coconut oil

¹⁰ Conversion factor .6 pound oil to one pound of copra.

practically disappeared. Even in these countries shipments had been greatly reduced. In 1922 the world's total export trade in coconut oil amounted to about 319,747,087 pounds of which 236,351,178 pounds or about 74 per cent were shipped from the Philippines.

MINNEAPOLIS, THE MILL CITY

Daniel R. Bergsmark

Economic Geographer

MINNEAPOLIS serves as a focus for a large agricultural region. It is situated on the marketward or eastern margin of the area of densest production of spring wheat, immediately to the south of the Upper Great Lakes Region, and near the northern margin of the Mixed Farming Region of the interior.¹ Minneapolis is consequently located near the junction of the three important interior regions of the United States, and its development is closely associated with the geographic conditions and development of these regions. Furthermore, its location on the Mississippi River, with the splendid water power developments at St. Anthony Falls is another factor of prime importance. That Minneapolis has her "raison d'être" in her possession of this last great factor will be shown later. The Mississippi River also provides a natural route for transportation and supplies the city with water.²

TRANSPORTATION AND POWER

The interdependence of roads and urban centers is expressed by Brunhes in the following words: "The road leads toward the urban center and depends upon it; but this constructed center also depends upon the road. The city creates the road; the road in its turn creates the city or recreates it."³

ROADS AND RAILROADS

Minneapolis is the terminus of railroads radiating in all directions. Most of the railroads run along the natural

routes afforded by the river valleys.⁴ The city is fortunate in another feature—it possesses a soil seldom equaled in its comparative freedom from mud and other annoyances, such as bad drainage, which too often makes sites otherwise favorable almost intolerable. With just sufficient sand in the soil to produce rapid absorption of rains, it furnishes satisfactory drives and streets for business and pleasure.⁵

WATERWAYS

In the early days the Mississippi River was the best means of transportation for merchants in bringing goods from the East and the South as well as lumber from the North. "How many cities and villages have been controlled in their plan by the waterway as well as by the land road."⁶ Goods were brought from St. Louis and other river points. There were, however, several disadvantages to river transportation: (1) the channel was shallow and poorly defined, (2) the currents were strong in the upper reaches of the river, and (3) the handling of freight at the terminals was very primitive. After the completion of the railroads, the river between St. Paul and Minneapolis was practically abandoned.

During the last few months there has been a special agitation on foot concerning navigation on the Mississippi River as far north as Minneapolis. A study was made to determine the available tonnage moving south from Minneapolis and other northern river points as well as the freight moving in the opposite direc-

¹ Stark, M. C. and Whittlesey, D. S., "Major Geographic Regions of North America."

² "Geology and Underground Water of Southern Minnesota," Water Supply Paper No. 256, page 203.

³ Brunhes, Jean, "Human Geography," page 171.

⁴ "U. S. G. S. Folio of Minneapolis and St. Paul," No. 201, page 3.

⁵ "Annual Exhibit of the Manufacturing and Commercial Industry of Minneapolis, 1872," page 3.

⁶ Brunhes, Jean, "Human Geography," page 173.



FIGURE 1.—The Minneapolis Terminus. Note the concrete wall on the opposite bank where the river is degrading its channel most rapidly, and the houses on the "river flats."

tion. The executive committee of the Upper Mississippi River Division of the Mississippi Valley Association presented this tonnage study to the chairman of the Inland Waterways Corporation, Washington, D. C., with the hope that it would appeal to him as a practical opportunity for developing a profitable government barge line on the Upper Mississippi. This study revealed the fact that the total tonnage possibilities amount to 4,368,508 tons.⁷ Further improvement of the Mississippi is now a certainty. A private concern will construct the barges, the Municipal Government will provide

the enterprise and keep the channel in good condition.

The river terminus in Minneapolis is located near the Washington Avenue bridge, a short distance below the St. Anthony Falls. This area is known as the "river flats."

The seven-mile section from the terminus to Fort Snelling was of steep slope, rapid current, and shallow depth, entirely unnavigable at low water. A large dam was built to overcome the entire fall in this distance. By concentrating the fall at the dam a valuable water power was made available which

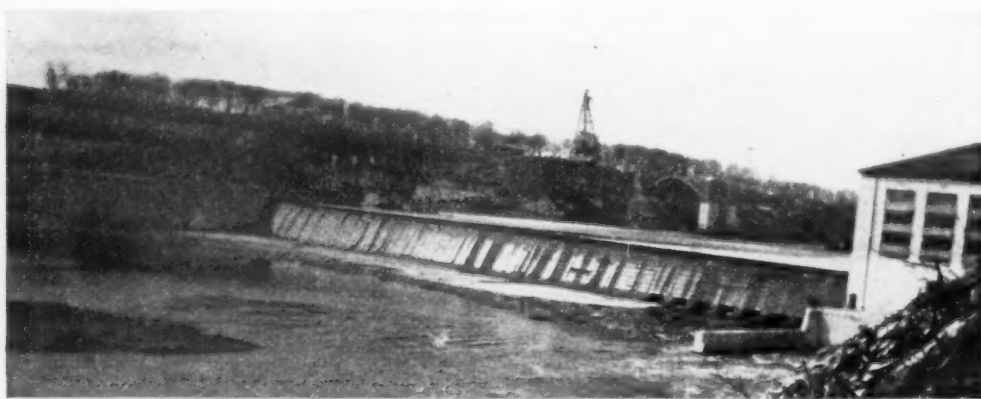


FIGURE 2.—Lower dam and lock near the Ford Motor Company.

capital for the terminal facilities, and the Federal Government is going to operate

⁷ Data secured from the Civic and Commerce Association, Minneapolis, Minn.

has been leased to the Ford Motor Company. The lock was opened to navigation in 1917. Since that time extensive dredging between the dam and



FIGURE 3.—St. Peter sandstone overlain by Platteville limestone.

Fort Snelling has provided a five-foot channel at low-water stage.

WATER POWER

The existence and preservation of the Falls of St. Anthony involves material interest of importance, not only to the state, but to the Northwest. Owing to the character of the rock formations at the Falls, rapid recession took place until stopped by the construction of concrete aprons. At the Falls the

was due (1) to the wearing away of the sandstone by the surging water at the foot of the Falls, and (2) by the water working through joints in the limestone, which fell in large blocks. In view of this rapidly increasing rate of recession the end would have been reached by this time had not recession been artificially checked by an apron or retaining wall.⁸

The power afforded by St. Anthony Falls is utilized by two dams. The upper dam operates under heads of 35



FIGURE 4.—The large concrete apron at the Falls.

Platteville limestone caps the St. Peter sandstone. The recession of the Falls

⁸ "U. S. G. S. Folio of Minneapolis and St. Paul," No. 201, page 13.

to 50 feet and affords about 47,000 horsepower. The lower dam gives a gross head of 20 feet and a total installed power of 10,000 horsepower.⁹

MANUFACTURING

Three factors appear to have been of prime importance in the development of Minneapolis as a manufacturing city: (1) Minneapolis is located on the Mississippi River and became the terminus for a large number of railroads, (2) Minneapolis is located in the Northern Interior which provides a large market for manufactured products,¹⁰ (3) the Falls of St. Anthony with their abundant

power afforded by the Falls of St. Anthony.

Nearly all the logs cut in northern Minnesota during the early days were floated directly to the mills at the Falls. The mills supplied the vast treeless prairies to the south and southwest with lumber and building material. At the present time, however, the industry has lost its relative importance. The products of the Minneapolis sawmills increased rapidly until 1900 when 595,000,000 board feet were cut. Since then the total cut diminished rapidly.¹¹

The importance and prosperity of Minneapolis today is directly related to



FIGURE 5.—The flour mills at the Falls of St. Anthony.

power, have been instrumental in establishing the major manufacturing industries.

The manufacture of lumber was the initial manufacturing industry in Minneapolis. The industry was based primarily on three factors: (1) proximity of the forests of white pine timber to the north, (2) feasibility of floating logs down the Mississippi River, the Rum River, and all their tributaries, and (3)

the flour-milling industry. Minneapolis is the great flour-milling center of the country. Located on the eastern margin of the spring wheat area and with sufficient power within its borders, Minneapolis was the logical center for the milling industry.

At the present time, Minneapolis has 26 flour mills with a yearly output of 12,059,557 barrels. The annual value of the flour-mill and grist-mill products of Minneapolis is about 228 million dollars.¹² Minneapolis has about two and one-half times as many flour mills as

⁹ "U. S. G. S. Folio of Minneapolis and St. Paul," No. 201, page 14.

¹⁰ "Minneapolis, the Market of the Northwest." This is a study compiled for presentation to the Federal Loan Board. The study presents Minneapolis as the logical focus for the Ninth Federal Reserve District.

¹¹ Data taken from United States Census report.

¹² "State Compendium of Minnesota, Fourteenth Census of the U. S.," page 145.

Buffalo or Kansas City (Minneapolis 26, Buffalo 10, and Kansas City 11), and about twice as many elevators as Port Arthur and Fort William. The elevator capacity of the latter places, however, is larger.¹³

In 1920 the manufacture of oil and linseed ranked second among the industries of the city.¹⁴ Good transportation facilities and proximity to the largest flax-producing area in the United States were factors in the origin and development of the oil and linseed industry of Minneapolis. Practically all the flaxseed produced in the United States is grown in the five Northwestern states of Minnesota, North and South Dakota, eastern Montana, and western Wisconsin. Here soil conditions and length of growing season make for this crop a permanent place in the scheme of agriculture.¹⁵

Minneapolis is also characterized by a variety of manufactures. Several factors have been instrumental in evolving this variety: (1) Minneapolis is favorably located for the production of flour and feed. The city is a natural gateway to the great Spring Wheat Area, and the Falls of St. Anthony furnish ample power. (2) Secondary industries have developed which use products of the primary industries. For example, in 1920 bread and other bakery products ranked fourth and food preparations seventh among the industries of the city. (3) The great demands of the prosperous market of the Northwest create a variety in products. (4) The useful minerals and raw materials of almost every kind employed in the arts are near here in abundance.

COMMERCE

By virtue of its favorable position and by means of a well-developed system of land transportation, Minneapolis has

¹³ "Forty-third Annual Report of the Chamber of Commerce (1925), Minneapolis, Minn.," page 129.

¹⁴ "State Compendium of Minnesota, Fourteenth Census of the U. S.," page 145.

¹⁵ "Minneapolis, the Market of the Northwest," Minneapolis Civic and Commerce Association, page 6.

become the focus for the collection of agricultural resources of a very large area, or the medium through which they pass. It is also the ultimate point of distribution for the commodities demanded by a rapidly growing population.

Products from the farm land of the Northern Interior are the chief commodities of the commerce of Minneapolis. The West offers the products of the soil and farm for manufactured products, while the East stands ready to furnish every known article of merchandise in return for wheat, flour, feed, etc. Of 108,700,000 bushels of wheat forwarded to Minneapolis in 1925, 55,100,000 bushels were used in local mills. The remainder went to outside markets.¹⁶

POPULATION

Minneapolis has experienced a continuous increase in population from the time it was founded. As the main gateway to the Northwest, the tide of immigration set strongly towards her. The percentage of increase was greater between 1860 and 1870 than during any subsequent decade. In 1870 the population numbered 13,066. According to the census of 1920, Minneapolis had over 380,000 people.

In the early days the city was built along the banks of the Mississippi River, but later it extended farther away from the original site. At present Minneapolis is growing in the direction of the gravelly plains of glacial outwash. Many lakes lie within the area and their scenic attraction and the advantages which they afford influence the distribution of the population.

FINANCIAL POSITION

The favorable location of Minneapolis for the manufacture of flour and the handling of wheat, as previously stated, has made the city a focal point which business seeks. The financial interests are directly related to the business enterprises of the city.

¹⁶ "Forty-third Annual Report, the Chamber of Commerce," page 123.

Undoubtedly the most important improvement that has been made in American banking since the National Act went into effect in 1863, was the installation of the Federal Reserve System. This system acts as an immense financial balance wheel of the country. Its establishment in 1914 marked a memorable milestone in the career of Minneapolis. Through the requirements of the act the country is divided into twelve reserve districts, each one being the plausible geographical unit representing a well-knit community of business interests. The National Board that was first appointed to "spy out" the lands and weigh the claims of the rival centers, recognized the fitness of the Northwest to be considered one of these geographical units, and eventually designated the states of Montana, North and South Dakota, Minnesota, and a part of Wisconsin and the Northern Peninsula of Michigan, as the Ninth Federal Reserve District. Minneapolis was chosen as the logical center of the bank for the district. It was the official recognition of Minneapolis as the chief financial and industrial point in the Northwest.¹⁷

SUMMARY

The broad geographic factors that have been operative in the growth of population and the development of manufactures in Minneapolis are associated with

its position and its great available water power. Various elements of the physical environment have been utilized successively. Its location on the Mississippi River was of prime importance in the early days of its growth. Logs from the white pine forests of the North were floated to the sawmills at the Falls. Later flour mills displaced most of the sawmills, and the flour-milling industry by a steady yearly increase kept pace with the development of the country tributary to it. At the present time, flour-milling is far and away the most important industry of the city, and Minneapolis boasts of more mills and the production of a greater amount of flour than any other city in America.

Navigation on the Mississippi will undoubtedly increase in the future due to more extensive river improvements and political stimulus. Whether the river project will influence commerce or manufactures to any appreciable extent is difficult to determine. Thus far it seems probable that the project will be a success locally, but whether it will be profitable in the long run or for the nation as a whole is an open question.

Minneapolis, along with a few other cities, has had a remarkable growth in population and industries. The continuous growth and many factors involved in its present prominence in manufactures and commerce, would seem to insure it for many years a prominent place among the cities of the country, both in industries and population.

¹⁷ Minneapolis Civic and Commerce Association, "Minneapolis, the Market of the Northwest."

BOOK REVIEWS

DEPARTMENT OF COMMERCE

Bureau of Foreign and Domestic Commerce

Commerce Yearbook for 1926.

For several years past the *Commerce Yearbook*, covering the foreign trade of the United States, has been issued annually. The 1926 edition will shortly be available, containing more trade information relative to the United States and the countries with which it trades than appeared in the earlier editions. This yearbook is the most complete and up-to-date regional and commodity analysis of the foreign commerce of the United States issued. Price, \$1.00.

Commerce Reports.

A weekly survey of foreign trade. This is an old publication in a new form. Material of value to the trade is received daily in the Bureau and sent on directly for publication in this weekly journal. Recently it has been enlarged and improved. Maps have become an established feature and illustrations obtained from the foreign representatives of the Department of Commerce are used in illustrating the articles. It may be of interest to geographers who are both studying and writing for themselves to know that copies of these maps and pictures may be obtained from the Bureau of Foreign and Domestic Commerce for use in their own publications.

Foreign Trade of the United States for the Calendar Year 1926. Trade Information Bulletin No. 460.

This brief statistical and text summary of the foreign trade of the United States reveals the highly satisfactory condition of this trade, with a steady upward trend of exports in finished manufactures so conspicuously characterizing our trade history for a number of decades past and more particularly during the post-war years. Price, 10 cents.

Great Lakes-to-Ocean Waterways. By E. S. Gregg and A. Lane Cricher. Domestic Commerce Series No. 4.

The several possible routes from the lakes to the oceans are surveyed and described. The potential traffic both in quantity and kind is outlined and the physical advantages and disadvantages of each route noted. Maps and graphs are used most effectively. In an appendix the national and state organizations interested in deep waterways to the oceans are listed and the statements and recommendations of these various organizations given. Statistical movement of commodities from the interior to the various ocean ports, the water-borne commerce of the United States by ports, the traffic on the St. Lawrence canals, and a number of other valuable statistical tables, are given. Price, 25 cents.

Railways of South America. Part II: Bolivia, Colombia, Ecuador, Guianas, Paraguay, Peru, Uruguay, and Venezuela. By W. Rodney Long. Trade Promotion Series No. 39.

A description is given of the outstanding physical features of each country, the routes followed by the railroads, the type of country through which each extends, and the type of construction on each road. Maps and illustrations are used effectively. Price, 85 cents.

Florida Transportation Field Survey. By A. Lane Cricher. Domestic Commerce Series No. 17.

A careful survey of the state as a whole, including its physical conditions and areal distribution of products for different commodities. The text and statistical tables of cars loaded give an accurate insight into the conditions of production. Terminal districts as determined by transportation conditions are mapped and described. Price, 20 cents.

Possibilities for Para Rubber Production in Northern Tropical America. By John C. Treadwell, C. Reed Hill, and H. H. Bennett. Trade Promotion Series No. 40.

A survey of the essential raw materials was authorized by the 67th Congress. The potential sources of rubber were explored by an able group of scientists from interested government departments by means of intensive field surveys. This bulletin contains the results of the work done in Northern Tropical America. In order to present clearly the possibilities for commercial production of rubber, a detailed description of each country is presented covering climate, soil, topography, native vegetation, and any other pertinent conditions. The material contained in this bulletin is practically all new and aside from its value to the rubber industry is a valuable geographic contribution. Maps, graphs, and pictures illustrate the volume. Price, 65 cents.

Colombian Public Finance. By Charles A. McQueen. Trade Promotion Series No. 43.

The financial conditions in Colombia are tied into their historical and present-day setting, so that this bulletin is in effect a careful survey of Colombian economic development, based upon both financial conditions and physical resources, and contains much hitherto unavailable geographic material. Price, 20 cents.

British Wages. By Charles E. Lyon. Trade Promotion Series No. 42.

A splendid survey of the recent situation in British industry and of considerable geographic value. Price, 15 cents.

Rice Trade in the Far East. By J. A. LeClerc. Trade Promotion Series No. 46.

Considerably over 90 per cent of the rice entering world trade is the product of Far Eastern countries. This careful text and statistical analysis thus is of considerable value. Price, 10 cents.

International Trade in Dried Fruit. By Leslie A. Wheeler. Trade Promotion Series No. 44.

The important production of dried fruits in the United States lends considerable significance to this careful survey of the world trade in these commodities, as it indicates the conditions which influence the importation of the American product into foreign countries and the competition which American fruits may expect to meet abroad. Price, 15 cents.

Production of Gutta-Percha, Balata, Chicle and Allies Gums. By Joseph W. Vander Laan. Trade Promotion Series No. 41.

These various gums are of considerable importance owing to their use, although bulking relatively small in commerce. Each of these is described, its source of production and the world consumption given, together with methods of gathering and shipping the product. The physical conditions within each important area are described, in addition to the organization of the industry, and labor conditions. Price, 15 cents.

Exclusive Sales Agreements in Foreign Trade. By Bernard A. Kosicki. Trade Promotion Series No. 45.

These sales agreements often so significant in the development of foreign trade are assembled within this one bulletin and afford valuable material for use in connection with foreign trade studies. Price, 10 cents.

Warehouse Contract Terms. By A. Lane Cricher. Domestic Commerce Series No. 18.

The warehouse is an integral part of our transportation and distribution system. Uniformity in contractual relationship between the warehouseman and his clients means not only elimination of waste in distribution but also facilitates the use of the warehouse receipt as a credit instrument. The standardization and simplification of contract terms and conditions for the warehouse industry as outlined in this bulletin are the result of cooperative work of the Bureau of Foreign and Domestic Commerce, warehousemen, and other groups interested. Price, 15 cents.

Trade Information Bulletins. Price, 10 cents.

No.	Name	By
454	Naval Stores	George H. Priest, Jr.
464	Bills of Exchange	Charles R. Grunty.
465	British Chemical Trade	Homer S. Fox.
463	Motor-Vehicle Taxation and Regulations in Foreign Countries	C. E. Haynes.

462 Advertising Automotive Products in Europe

J. A. G. Pennington.
Chas. H. Cunningham
and Philip M. Copp.
Almon F. Rockwell.

455 Portugal

461 Czechoslovakia

467 The Chinese Motion Picture Market

C. J. North.

466 Investments in Latin America—IV. Bolivia

F. M. Halsey and J. C. Corliss.

Monthly Summary of the Foreign Commerce of the United States, Parts I and II, December 1926, contains a summary of the foreign trade of the United States for the calendar year, 1926. The January, February, and March issues present the trade for each of those months.

BUREAU OF MINES

Coal in 1924. By James E. Black, L. Mann, and F. G. Tryon.

Section of mineral resources for 1924, and contains complete statistical and text material. Price, 20 cents.

Cement in 1925. By B. W. Bagley. Price, 5 cents.

Silver, Copper, Lead, and Zinc in the Central States. By J. P. Dunlop and H. M. Meyer. Price, 10 cents.

Potash in 1925. By A. T. Coons. Price, 5 cents.

Underground Limestone Mining. By J. R. Thoenen. Bulletin 262.

With the enormous and constantly increasing demand for limestone to supply a multitude of users, it is not surprising that deposits at or near the surface are gradually being exhausted, and that less advantageous supplies are being worked. Quarries are becoming deeper and wider year by year, and in many places the volume of overburden that must be removed to allow open-pit work has increased alarmingly. Out of this situation has come the growing tendency to mine limestone. The bulletin contains a careful analysis of this developing industry, well illustrated by pictures and graphs. Price, 30 cents.

COAST AND GEODETIC SURVEY

Geodetic Level and Rod. By D. L. Parkhurst. Serial No. 376. Special Publication No. 129.

The types of instruments used by the Coast and Geodetic Survey in surveys made since 1900 are carefully described and pictured. This bulletin will be of value to the geographer who is going out with his plane table for geographic field work.

Tables for Albers Projection. By Oscar S. Adams. Serial No. 378. Special Publication No. 130.

The general qualities and the mathematical theory of this projection which is being used by the Geological Survey of the United States are contained in this publication.

Tides and Currents in Southeast Alaska. By R. W. Woodworth and F. J. Haight. Serial No. 364. Special Publication No. 127.

These tables and descriptions of the tides and currents in Southeast Alaska include also a survey of the country involved and excellent maps. Price, 25 cents.

Tide Tables Pacific Coast, North America, Eastern Asia and Island Groups 1928. Serial No. 372. Price, 15 cents.

Current Tables Atlantic Coast, North America 1928. Serial No. 365. Price, 10 cents.

BUREAU OF FISHERIES

Pacific Cod Fisheries. By John N. Cobb. Document No. 1014.

"The history of the Pacific cod fishery is a record of the strenuous struggle of a few individuals and companies against its giant brother on the Atlantic coast, which, backed by great wealth, the prestige and advantage gained by years of unopposed command of the American markets, an almost unlimited supply of raw product, and at times the ability to import from the eastern Provinces of Canada large supplies free of all duty, has had an immense advantage over its younger and weaker brother. From the very beginning San Francisco has occupied the premier position in the Pacific cod fishery. For a number of years the majority of the San Francisco vessels resorted to the Okhotsk Sea for their cargoes of cod, and in some seasons nearly all of the vessel fishing was prosecuted there. In 1891 Capt. J. A. Matheson, of Provincetown, Mass., who had been engaged in the Atlantic codfishery for a number of years, sent his schooner around the Horn, coming west himself by rail. The natives living in the vicinity of the great cod banks of Alaska have depended upon them for a considerable part of their food supply, although not to such an important extent as they have upon the salmon. The demand for cod engendered by the World War was felt all over the world, and the high prices realized drew a large number of Kodiak fishermen into the business. The demand for cod created by the war also led to the establishment of numerous small local stations scattered along the Alaska Peninsula and the numerous islands lying to the south of these and on the Aleutian chain. A notable feature of the industry in recent years has been the large number of individuals and meagerly financed companies preparing codfish for the market. This work is carried on mainly during the winter months, when fishing for other species than cod is suspended. It requires but little capital, and as the demand in Washington has been fairly good, it has proved a remunerative source of income to the more energetic fishermen." Such is a brief outline of the Pacific cod fishery which is given with interesting completeness in the

bulletin. In addition the fishing industry itself is described, together with the regions from which it comes. Statistical material for the industry is also given. Price, 25 cents.

Propagation and Distribution of Food Fishes. Fiscal Year 1926. By Glen C. Leach. Bureau of Fisheries Document No. 1011. Price, 10 cents.

This work of the Bureau of Fisheries is extremely valuable and significant and is carefully outlined by means of text and statistics.

BUREAU OF THE CENSUS

Survey of Current Business.

This survey presents by graphs and statistics, as well as text, the general trend of business conditions as a whole and in separate industries during the month of March. Subscription price, \$1.50 per year; single copies, monthly, 10 cents; semi-annually issued, 25 cents.

Financial Statistics of States, 1925. Price, 20 cents.

Census of Agriculture, 1925.

There is no more important contribution to constructive legislation and economic planning than the Census of Agriculture, which has been authorized to be taken each five years instead of each ten years as heretofore. The reports are being issued in separate pamphlets by states. In addition to those already published Kentucky, New Mexico, North Carolina, and Mississippi are now available.

Pulp-Wood Consumption and Wood-Pulp Production. Compiled in coöperation with the Department of Agriculture, Forest Service. Price, 5 cents.

Some valuable material bearing upon this important subject.

BUREAU OF NAVIGATION

Merchant Marine Statistics, 1926. No. 3. Price, 15 cents.

American Documented Seagoing Merchant Vessels of over 500 Gross Tons and over. February 1, 1927. Serial No. 111. Annual subscription, 75 cents; single copies, 10 cents.

Merchant Vessels of the United States, 1926. Price, \$1.75.

LIGHT HOUSE SERVICE

Light List Atlantic and Gulf Coast of the United States, 1927. Price, 50 cents.

Light List Pacific Coast of the United States, 1927. Price, 30 cents.

All of the above publications can be obtained from the Superintendent of Documents, Washington, D. C.

The Department of Commerce, the Department of Agriculture, and the U. S. Geodetic

Survey all issue monthly lists of publications. These are of great service in enabling one to keep in touch with the recent and up-to-date publications of these departments. By writing the department concerned one's name may be placed on the mailing list to receive them each month.

HELEN M. STRONG.

BAIN, H. FOSTER. *Ores and Industry in the Far East*. x and 229 pp.; charts, maps, bibliography, and index. Council on Foreign Relations, New York, 1927. 9 x 6 inches. \$3.50.

Ores and Industry in the Far East is one of those rare and important books that combine with timely interest the greatest permanent value as an authoritative reference, and as a scientific appraisal of the resources and their significance, of one of the most populous and potentially influential regions of the world. The book is absolutely the last word on the subject of which it treats. The fact that H. Foster Bain is the author justifies the belief that this would be so; the mass of conclusive data now available which he presents impartially and critically proves that the belief is well founded.

The book is an exhaustive treatise on the production and potential reserves of minerals in the Far East, and the effect their character, extent, distribution, and utilization may have, not only upon the Far East itself, but upon the industries, the trade, and the economic and political relations of the rest of the world. The coal fields, the petroleum possibilities, the iron and steel potentialities and the significance of non-ferrous metals comprise the major matter of the book, so far as space is concerned; but the analysis of the conditions affecting mineral development in the Far East, and the prospects of the future to which the forty pages of the two concluding paragraphs are devoted, is the most impressive, and certainly the most startling, to the mass of readers.

As Professor Edwin F. Gay, professor of economic history in Harvard University, so succinctly states in his admirable preface to the book, "It is often assumed that when China becomes aroused to the need of equipping herself with the tools and technique of America and Europe, there will be a great and rapid industrial and commercial advance comparable with that of England, Germany, and the United States during the last century. Her supposed untold wealth, in 'vast resources' of raw materials and man power, when organized, is to produce, we are told, both the fiercest industrial competition the world has ever seen and the greatest potential market. The Industrial Revolution of the West, it is forebodingly asserted, is only the curtain-raiser for the vaster drama of the twentieth century to be played in Asia, where 'the stage seems set for catastrophe.'" This has assuredly been the

general opinion of our Occidental peoples and their statesmen.

Then to be shown conclusively by this book, as the author points out in his final chapter, that "the Far Eastern countries do not contain such supplies of mineral resources as will permit the development of an industrial system according to Western standards" quite upsets our old idea of the ultimate economic dominance of the lands bordering the Pacific Basin, which has so generally been held for many years.

The author goes on to state that "No attempt need be made here to discuss the larger question whether it is necessary or desirable that the Far East should follow the West along the path of industrialization, or even whether it will do so. The answer to such questions lies in the psychology of peoples and is outside the scope of this study. Present concern is only with the problem of whether or not the Far East contains the resources, and particularly the exhaustible mineral resources, to support such an industrialization of its people in the event that a wholesale change in that direction be attempted. This is a question of fact, and to it the correct answer is undoubtedly an unqualified negative."

It is an illuminating book. Economic geographers will use it as the light for a whole new study of Pacific relationships. Economists, students of international politics, and above all the statesmen of the powers of the world, will be guided by the new way which this brilliant book points out for the solution of the Far East problem. The lay people of every civilized country with their widened interest in the world beyond the borders of their own land, will enjoy this book, and by the conviction produced by its rich factual content will revise their estimates of Far East influence and clear away many misconceptions to which inadequate or incomplete facts have given rise for a century past.

It is a valuable book, very necessary to every library, private or public.

W. ELMER EKBLAW.

MALLORY, WALTER H. *China: Land of Famine*. xvi and 199 pp.; 90 pictures, 12 maps, and index. American Geographic Society, Special Publication No. 6, New York, 1926. 7 x 10 1/4 inches.

In *China: Land of Famine* Mr. Walter H. Mallory, who has had experience in relief work in many lands and has completed five years of service as secretary of the China International Famine Relief Commission, analyzes the great famine problem with an understanding and appreciation held by few, if any. He vividly portrays its various causes and possible cures.

At the base of all the economic causes of famine—lack of adequate credit facilities aggravated by the unscrupulous methods of money lenders, antiquated agricultural methods in spite

of intensive cultivation and the maintenance of soil fertility, inefficient land transportation means and slow water transport, and the unwillingness to leave crowded lands for new fields—lies the fundamental cause, a density of population greater than the land can support. The overpopulated land makes impossible any reserve of foodstuffs. A good crop means only better and more food for the season; thus when a poor year comes the people find themselves without food.

Although the chief causes of famine may be traced to economic conditions, the immediate cause generally results from natural phenomenon. Long periods of drought cause the total failure of crops; severe floods inundate thousands of square miles of good farm lands, and sweep away life and property; flooded lands drain slowly; migrating locusts, which consume crops, leave the land as barren as a protracted drought.

Political conditions—revolutions, destruction of public granary system, neglect of famine prevention, banditry, excess troops, and excess taxation by unscrupulous officials—and social conditions—tremendously high birth rate, ancestor worship, unnecessary waste from ceremonies and overeating, undue conservatism, the lack of coöperation—all serve to augment the effect of economic relations and natural phenomenon in causing famine.

To relieve adequately the chronic famine situation in China a stable and effective government seems essential. Several lines of work pursued separately or together will go far to relieve conditions and to give greater and greater insurance against the terrible disasters which have come in the past. "In order of importance they are:

1. Flood control, irrigation, land reclamation.
2. Economic improvement, rural credits, colonization, home and village industry.
3. Improved agriculture and forestation.
4. Development of transportation.
5. Education."

Some progress along the preceding lines is being made day by day. It must be continued to release the masses from the constant threat of starvation.

The material in this volume, well organized and clearly presented, gives the reader a remarkable understanding of *China: Land of Famine*—the great problem facing that nation, and of an outlook for the world as a whole, with overpopulation now a matter of world concern.

CLARENCE F. JONES.

DUTCHER, G. M. *The Political Awakening of the East*. 372 pp. The Abingdon Press: New York and Cincinnati, 1925. \$2.50.

As the title suggests, this is a book treating primarily the political and historical evolution of the East, though not to the exclusion of its commercial, economic, geographic, and social development. Its value to the geographer lies not so much in its strictly geographical material as in its

wealth of historical and political data which form so valuable a background for the geographer. In no other volume, with which the reviewer is acquainted, is there to be found so excellent a summary of the modernization and unrest of the East.

The book consists of an introduction and preface and six chapters treating in order Egypt, India, China, Japan, the Philippines, and the problem of progress in the East. The supplementary notes attached to each chapter bring the contents up-to-date till the autumn of 1924.

From the first page to the last, the reader feels that Professor Dutcher *knows* the subject he so ably treats. Thus he gains the reader's confidence immediately. Furthermore, not one page suffers from aridity; on the contrary every one offers enlightenment and interest.

The Political Awakening of the East is the result of wide reading and of personal investigations. During the year 1921-1922, Professor Dutcher was in the East on sabbatical leave, and was thus able to observe, while on the ground, the important changes that were in progress in each country.

In his discussion of Egypt, the author emphasizes the fact that whatever the reasons were which lured conquerors to the land of the Nile, Egypt itself was not the magnet. To the Venetians it was merely an entrepôt on a great trade route; to the French it was a half-way station between Europe and the East; and to the British it is a strategic point along the jugular vein of the Empire—the Mediterranean Trade Route with its Suez Canal. As to the value of the Suez route to England, we note that "Other items may be compromised or yielded, but on this one Great Britain must stand firm . . . meanwhile Suez is more vital to Britain than Panama to the United States."

The country and its inhabitants—the *fellaheen*—are ably presented. Agriculture is given as the almost unique resource of wealth. The *fellaheen*, comprising nine-tenths of the total population, cultivate the soil as their forebears have done since the dawn of history.

The land holding system is most unfortunate; 1,700,000 natives, constituting more than 90 per cent of the landholders, possess holdings of less than 5 acres each, and control only 27 per cent of the cultivated land, whereas 13,500 persons, or less than 1 per cent of the land holders, control more than 40 per cent of the tillable land in tracts of more than 50 acres each. The future, however, seems brighter.

British rule, according to the author, has been excellent and beneficial in its economic and administration activities.

India is a complex problem in comparison with Egypt, for it is a vast continental area inhabited by one-fifth of mankind, diverse in race and language and variegated in religion and historical experience.

The British have converted India from a "geographical expression into an empire, from a congeries of peoples into a nation." The unification of India is considered by the author to be a more remarkable achievement than that of either Germany or Italy.

India's future lies in the steady growth of self-government under British protection and guidance and "not upon listening to the rabid doctrines of the British Tory or of the Bengali Brahmin extremist." The development of sympathy and coöperation is imperative.

The Chinese problem differs greatly from those of the two other countries, for racially the Chinese are absolutely unrelated to the Egyptians or the Indians, and they have known nothing but national independence.

The 60 pages devoted to China form an excellent historical and political background for understanding the present chaotic situation in China.

Transportation should be extended as a precaution against famines, as a means of disposing of the output of rich mines, to develop the country's commerce, and most important of all to unify the country. No central government will be able to function without better means of transportation.

The Chinese revolution is economic and political, but it is also intellectual and social. Furthermore it is more than a revolution—it is a renaissance.

Japan presents radical contrasts with Egypt, India, and China. It is an island country, and is the only one not to have been successfully attacked. It has never submitted to foreign dictation. "The story of Japan's development has been that of the deliberate effort of a people to carry out for themselves an industrial revolution and a readjustment of their political system to accord with new conditions."

The population question (probably the most significant confronting the Japanese today) is discussed and three possible solutions advanced: (1) an extension of the cultivated area and more scientific tillage, (2) an industrial revolution, and (3) a national policy of expansion. All three are being tried, the first two with considerable success. In expansion the Japanese have been unable to adapt themselves easily or quickly to new and different environmental conditions. They found Hokkaido too cold and Formosa too hot. And in Chosen and Manchuria they have been unable to compete with the Koreans and the Chinese, who live on a narrow margin of existence. Thus it would appear that the country's future lies along industrial lines.

The Filipino people differ markedly from the inhabitants of the four other countries in that more than 90 per cent of them are Christians. Thus they have a different outlook upon western civilization. The small size of the main islands and the great distances between them, as well as the variety of languages, are responsible for the lack of unity in the Philippines.

The future of the islands lies in agriculture, though the agricultural development and the marketing of the products will require better means of transportation. There are now but 900 miles of railway in the islands. The author believes that the United States should exert some kind of control over the Philippines.

The final chapter, "Problems of Progress in the East," consists of reflections upon the contents of the preceding chapters.

Two minor inaccuracies occur. Thus, on page 144, through the statement, "Cattle have been scarce except as work animals," one might get the idea that they are important numerically as beasts of burden. As a matter of fact they are not plentiful because there is little room for them. Also, on page 115, we are told that "the valley of the Yang-tse . . . has been one of the cradles of the human race and one of the great sources from which civilization has been diffused." The Wei should have been given instead of the Yang-tse.

However, there is little to criticize in Professor Dutcher's story, for he has told it in a masterly fashion. His book will appeal to readers in so many different fields that it should have a wide circulation, and especially at this time, when China occupies the center of the international stage.

LANGDON WHITE.

BOGART, ERNEST L. and LANDON, CHARLES E. *Modern Industry*. x and 593 pp.; maps, charts, photographs, index. Longmans, Green & Company, New York, 1927. 8¾ x 6 inches. \$3.75.

This excellent book is intended as a background to a study of the principles of economics. It is descriptive and expository, not highly theoretical. It fills a gap that has stood wide open in the text-books available in the field. The technical geographer may be disposed to consider that the book fails to go deeply enough into the physical fundamentals; the trained economist may aver that it does not develop the economic principles far enough; but to the great mass of teachers in high schools, normal schools, and undergraduate colleges and universities it will come as a distinct and long desired help.

Very few books adequately or successfully cover the indefinite transition field between two sciences. They are prone to emphasize one or the other extreme to the detriment of the middle ground, to accentuate one border or the other, and so minimize the importance of the relationships between the two. In *Modern Industry* the authors have maintained their purpose to cover the bases of industrial economics in the broad meaning of the phrase, giving due attention to the phases of geography upon which industry is founded, to the phases of economics directly based upon these fundamentals, and developing fully the broad field of relationship between the two. They have not transgressed too far upon

the province of geography, nor penetrated too far into the domain of economic theory, to maintain the balance they purposed in preparing the book. As a consequence they have succeeded admirably in doing just the thing they declared in their preface they set out to do, and have produced a highly serviceable book for the beginner in economics, and the student of economic geography. The measure of their success will be the sale and use of the book, which, we venture to predict, will be wide and long-continued.

For *Modern Industry* is practical. As the authors state in their preface, "it deals with industry rather than with business and therefore touches lightly the subjects of transportation, money, and marketing. It is primarily concerned with making goods, not money profits; it discusses the technological work of society, and not the pecuniary. It conceives of the world of industry as a vast going concern and attempts to describe the work which it does and the relations of the different parts to each other. It approaches the problems of industry from the functional standpoint, being concerned with activities rather than structures, with work rather than organization. Whenever possible it has emphasized the debt which modern industry owes to science."

Besides being such an excellent introductory work, it opens the way, by its thoughtfully selected bibliography at the close of each chapter, to further study in any particular field in which the reader may be interested. In every way it is a useful, satisfactory book for the purpose for which it was written.

W. ELMER EKBLAW.

MAULDON, F. R. E. *A Study in Social Economics: the Hunter River Valley*. v and 201 pp.; maps and diagrams; appendices and index. Robertson and Mullens Limited, Melbourne, 1927. 5 1/2 x 8 1/2. 12/6.

Interesting Australia again claims the attention of every geographer, in F. R. E. Mauldon's excellent presentation of what actually comprises a concise geographic consideration, albeit slightly disjointed, of the Hunter Valley. As a study in social economics, sponsored by the Workers' Educational Association of New South Wales in its series of economic, political, and social writings, the volume is not intended as a model of geographic treatment. Nevertheless, quite comprehensive descriptions of relief, structure, climate, soils, and vegetation, plus a definition of geography, to which objections are legion, lead one to offer what is hoped will be regarded as constructive criticism.

The discussion of the economic activities of the people inhabiting the well-defined unit offered by the valley of the Hunter River and its principal urban center, Newcastle, to say the least, is excellent. In four fine chapters, concerning the primary (land), extractive (coal mining), manu-

factural (manufactures), and connective (transport and commerce) industries of the valley, one gains a clear concept of the economic geography of the region. Furthermore, critical analyses of industrial and commercial conditions, arising from the growth of one of Australia's greatest manufacturing districts, enhance greatly the value of the volume. Chapter IV, "Livelihood from the Land," is a well-written description of the valley from the viewpoint of regional agricultural geography. The study derives no small share of its merit from this chapter, which presents its facts in well-organized fashion.

But Chapters I, II, and III are not representative of the general worth of the volume. An attempt to present the facts of relief for an explanation of agricultural activities, of geology to explain coal mining, and of geographic location to understand commerce and manufactures gives the reader a fund of information, information which is woefully incoherent, overemphasizing exceedingly irrelevant material and slighting significant facts.

Yet, upon this rambling foundation, the author fashions his noteworthy economic structure, in which a keen appreciation of geographic factors constantly appears. As such, the volume merits definite approval by geographer and economist alike.

CHARLES GOOZE.

JAMES, HARLEAN. *Land Planning in the United States for the City, State, and Nation*. xxviii and 427 pages, with maps, photographs, sketches, bibliography and index. The Macmillan Company, New York, 1926. 8 x 5 inches. \$5.00.

This volume, which is one of the Land Economics Series edited by Dr. Richard T. Ely, presents clearly the problems connected with the planning of the city, state, and nation.

The outline of the work is suggestive of its contents. Divided into three sections, the first and second sections deal primarily with the problems in connection with the planning of the urban center, considering such topics as (1) layouts of early settlements, (2) history of city planning in the United States, (3) principles of city planning, (4) the layout, width and arrangement of the streets, (5) traffic and transportation problems, (6) public parks, (7) buildings, (8) zoning, and (9) regional planning. These sections of the book, although they present some new and interesting materials which are of value to the student of urban geography, have no particular advantages over former standard works such as *The Planning of the Modern City*, by Nelson P. Lewis.

The third section is quite unique in a publication of this type in that it discusses the planning idea for the state and nation, considering such topics as (1) the acquisition and distribution of the public domain, (2) land utilization, (3) forest

areas, (4) recreation and scenic areas, such as national and state parks, (5) water resources, (6) land communications, (7) agricultural lands, and (8) the development of federal and state planning agencies. Land planning outside of the city and its immediate environment is a matter about which the average American citizen has given little thought. The use, abuse, and destruction of many of our natural resources, especially those of the public domain, furnish ample proof of this. It is time that the American people gave more thought to national and state planning for the better utilization of the natural environment, and elevate this study to the plane now occupied by city planning.

Turning from the organization of the book to its contents, the geographer will find numerous topics of interest within its pages. On page 40 is an interesting plan of a typical New England farm showing the barns and various sheds connected to the house—a fine adjustment to the cold and snowy winter weather. On page 75 the author gives a vivid picture of the average small American town, with the reasons for its developments along certain lines. Another pleasing contribution to the book is the substitution of many excellent sketches for photographs. There are, however, numerous photographs, most of them areal pictures of important cities of the country, and many maps of city layouts. Finally, there is an excellent bibliography at the end of each chapter.

The book is well organized and written, and although not designed for the geographer it would make a valuable reference for any teacher interested in urban geography or in the conservation of natural resources.

EDWIN J. FOSCUE.

BUECHEL, FREDERICK A. *The Commerce of Agriculture; A Survey of Agricultural Resources.* ix and 439 pp.; maps and illustrations. John Wiley and Sons, New York, 1926. 9 x 6 inches. \$3.75.

The Commerce of Agriculture contains a wealth of factual material that every economic geogra-

pher is glad to have at hand, particularly if he be interested in its agricultural phase. It is just the kind of material that the teacher and student need, both because of its content and of its stimulating suggestiveness of other and further worthwhile fields of study.

The leading title of the book is a misnomer; the subtitle is more appropriate, though even that is somewhat misleading as it is inadequate. The organization and composition of the subject matter is not uniformly good throughout, for in places it seems confusing or ambiguous. While the style is uniformly clear and logical, a number of carelessly expressed statements detract from its general standard. The references at the end of the four major divisions of the book are all too few.

With these minor adverse criticisms duly disposed of, the favorable features of the book loom so large and numerous, that the general excellence of the book must receive the approval it deserves. The balance between the four major divisions—(1) "Land Supply in Relation to Population Pressure"; (2) "Physical Environment of Agriculture"; (3) "Food, Fiber, and Forest Resources of the World"; (4) "Agriculture in World Trade"—is nicely adjusted and maintained. The chief emphasis is placed upon Part 3; the secondary accent upon Part 2; and Parts 3 and 4 are but briefly, though not incidentally, treated. Enough history is included to give proper perspective. Enough economics is applied to elucidate the influence of social and political activities. Enough botany, geology, and chemistry are introduced to explain both natural and mechanical processes. Enough geography is utilized throughout to correlate the manifold phases of agricultural production and distribution. Enough common sense is constantly employed to select relevant, interesting, and logical material.

The book fills a real need. It serves as a pioneer. It has many virtues and few faults. It should sell well and prove popular.

W. ELMER EKBLAW.

OUR CONTEMPORARIES

THE GEOGRAPHICAL REVIEW

Vol. XVII, No. 2. April, 1927

Northern Arabia: The Explorations of Alois Musil. 30 pages. John Kirtland Wright.
A regional study of much anthropogeographic significance.

The Colonization of Eastern Greenland: Eskimo Settlement on Scoresby Sound. 19 pages.
Ejnar Mikkelsen.

Denmark's venture in directed colonization of Eskimo settlers upon the desolate coast of East Greenland. A noteworthy article.

Notes on the Problem of Field Erosion. 10 pages. W. C. Lowdermilk and J. Russell Smith.
A valuable physiographic contribution from an economic point of view.

South Dakota and Some Misapprehensions. 15 pages. Freeman Ward.
A timely article, substantial and illuminating. Needed in every library.

Persistence of Features in an Arid Landscape: The Navajo Twins, Utah. 7 pages. Kirk Bryan and E. C. La Rue.
Another brief physiographic paper of interest.

The Great Lakes-St. Lawrence Waterway. 20 pages. Philip W. Henry.
A critical study on a controversial subject that deserves widespread attention.

The Physiographic Interpretation of the Fall Line. 9 pages. George T. Renner, Jr.
Doctor Renner now has a peneplain of his own! A brilliant, brief paper.

World Unity. 14 pages. George G. Chisholm.
A master meditates philosophically upon a fascinating geographic dream that may become a reality.

The Millionth Map of Hispanic America. 8 pages. Raye R. Platt.
A satisfactory report of progress.

THE JOURNAL OF GEOGRAPHY

Vol. XXVI, No. 3. March, 1927

Destructive Effects of a Hail Storm in a City. 5 pages. Edwin J. Foscue.
A worth-while contribution, direct and effective.

Forestry. An Eighth Grade Project. 8 pages. Winifred D. Broderick.
Project and justifiable propaganda.

Supplementary Geographical Literature for Elementary and Junior High Grades. 5 pages.
Ella B. Knight.
A brief but comprehensive discussion.

The Laboratory Plan of Teaching Geography. 6 pages. Angela Broening.
Convincing pedagogical paper.

Criteria for Choosing and Using Geographic Materials in Elementary School Geography.
3 pages. Julia M. Shipman.
Excellent but altogether too brief.

A College Cruise Around the World. 8 pages. Douglas C. Ridgley.
New viewpoint, new approach, new presentation of new ideas.

With the Spanish Aviators. 1 page. Alice Bundy.

THE JOURNAL OF GEOGRAPHY

Vol. XXVI, No. 4. April, 1927

Nicaragua: Revolution and Intervention. 7 pages. Robert S. Platt.
A timely and succinct article.

Notes on the Geography of Trinidad. 13 pages. Preston E. James.

A small field well cultivated.

Northward Ho from Cape Town. 5 pages. Ida Belle Taylor.

Enthusiasm unbounded, and good geography.

Unit Topics Suitable for Junior High School Geography. 9 pages. Maude Cottingham Martin.

Logical treatment of a difficult problem by a competent, trained teacher.

Ships at Sea. No. 1. 5 pages. Douglas C. Ridgley.

Practical application of navigation to geography.

THE JOURNAL OF GEOGRAPHY

Vol. XXVI, No. 5. May, 1927

Contribution of Geography in Senior High Schools. 10 pages. Albert P. Brigham.

A most convincing argument from one authorized by long experience to speak for geography.

The Republic of Austria. 15 pages. Alice Krackowizer.

A little propaganda, much history, and very much geography.

First Lessons in Continent Study. 5 pages. Selma Abrams.

A rather inadequate treatment of an important field.

Ships at Sea. No. 2. 3 pages. Douglas C. Ridgley.

Weather in its relation to navigation.

Habit, Memory, Imagination and Appreciation in Elementary School Geography. 2 pages

Mary A. Dorgan.

THE NATIONAL GEOGRAPHIC MAGAZINE

Vol. LI, No. 3. March, 1927

Ireland: The Rock Whence I Was Hewn. 59 pages. Donn Byrne.

Typically refreshing, with many superb pictures and a very little geography.

The Hills and Dales of Erin and Vermont. 17 natural color photographs. Clifton Adams.

Lovely color pictures.

The Green Mountain State. 36 pages. Herbert Corey.

Geography of Vermont—chiefly in the pictures.

Nicaragua, Largest of Central American Republics. 8 pages.

Pictorial impressions.

THE NATIONAL GEOGRAPHIC MAGAZINE

Vol. LI, No. 4. April, 1927

The Races of Domestic Fowl. 56 pages. M. A. Jull.

Phasianine geography and history.

Fowl of the Old and New World. 29 paintings from life. Hashime Murayama.

No one need longer confuse a Buff Cochins with a Poland China, a Rhode Island Red with a Polled Durham.

America's Debt to the Hen. 14 pages. Harry R. Lewis.

Mostly oological economics.

The Chinese: Farmers Since the Days of Noah. 31 pages. Adam Warwick.

An excellent geographic article.

THE NATIONAL GEOGRAPHIC MAGAZINE

Vol. LI, No. 5. May, 1927

Among the Zapotecs of Mexico. 52 pages. Herbert Corey.

Unusual description of a little known region.

The Family Tree of the Flowers. 10 pages. Frederic E. Clements and William Joseph Shewalter.

A valuable floral contribution.

Wild Flowers of the West. 56 pages. Edith S. Clements.

Brilliant pictures, true to natural color.

THE NATIONAL GEOGRAPHIC MAGAZINE

Vol. LI, No. 5. June, 1927

Ho for the Soochow Ho. 27 pages. Mabel Craft Deering.

Concentrated geography in sugar-coated pictures.

The Geography of China. 13 pages. Frank Johnson Goodnow.

A summary of geographic relationships. Little new material.

Life Afloat in China. 21 pages. Robert F. Fitch.

A pictorial account of one of China's distinctive responses.

New China and the Printed Page. 18 pages. Paul Hutchinson.

A brief account of an important development.

Among the People of Cathay. 16 illustrations in Duotone.

Lavish color; life in rainbow tints.

Hospitality of the Czechs. 4 pages. Worth E. Shoults.

An appreciative bit of geography.

Costumes of Czechoslovakia. 19 natural color photographs. Hans Hildenbrand.

Color to spare.

THE BULLETIN OF THE GEOGRAPHICAL SOCIETY OF PHILADELPHIA

Vol. XXV, No. 2. April, 1927

Exploration of the Cariboo Mountains of British Columbia. 18 pages. Rollin T. Chamberlin.

Mountain climbing and geology.

The Bottom of the Ocean. 7 pages. Johan Menander.

A submarine landscape.

JOURNAL OF LAND AND PUBLIC UTILITY ECONOMICS

Vol. III, No. 2. May, 1927

The Florida Land Boom. 16 pages. Homer B. Vanderblue.

Hydro-Electric Power Policies in Ontario and Quebec. 12 pages. Harald S. Patton.

Interesting to industrial geographers.

The Share of Agriculture in the National Income. 17 pages. Henry C. Taylor and Jacob

Perlman.

Some Problems of Recreational Land. 9 pages. George S. Wehrwein.

A valuable and discriminating study.

The Rise and Decline of Municipal Ownership in the Electric Light and Power Industry of

Wisconsin. 9 pages. Herbert B. Dorau.

Agricultural Estate Management. 3 pages. H. C. Taylor.

Problems of Agricultural Estate Management. 3 pages. D. Howard Doane.

A Study of Utility Financial Structures: Distribution of Income. 14 pages. A. E. Patton and O. Gressens.

Development and Present Scope of Land Economics. 4 pages. George S. Wehrwein.

WORLD AGRICULTURE

Vol. VI, No. 4. Winter, 1927

First Agricultural Missions Number

The International Association of Agricultural Missions. 1 page. The Editor.
Christianizing the Economic Life of the World. 2 pages. Conference Report of Anna M. Clark.

Agricultural Missions in Liberia. 1 page. James L. Sibley.

The Rural Church in its Relation to the Farmer's Standard of Living. 1 page. E. L. Kirkpatrick.

Farm Youth—Topic of Ninth Annual Conference, American Country Life Association, Washington, D. C. 1 page.

Some Recent Developments in Agricultural Education and Research in Europe.—Part I: Agricultural Education. 1 page. Dean A. R. Mann.

WORLD AGRICULTURE

Vol. VII, No. 1. Spring, 1927

Imminent International Meetings

The Pan-Pacific Conference.

The Cornell Conference of the International Association of Agricultural Missions.

The League of Nations Economic Conference.

XIIIth International Congress of Agriculture.

International Conference of Agricultural Associations.

International Congress of Soil Science.

World's Poultry Congress.

International Country Life Conference.

World Agriculture Society Meeting.

World Federation of Educational Associations.

The Home Garden: Plant Interchange with China. 1 page. Vivien May Parker.

Agricultural Missions: Shall Missions Cease? Mabel Carney.

Saving Albania. C. Telford Erickson.

The International Commission of Agriculture: Recommendations to the Economic Conference. Marquis de Vogüé.

ANNOUNCEMENT

THE series of articles on *South American Commerce*, by Dr. Clarence F. Jones, of which the sixth instalment, "The Trade of Uruguay," appears in this number, will continue in each successive issue until completed.

The series of articles, *Agricultural Regions of the World*, is continued in this issue with the third instalment of *Agricultural Regions of North America*, by Dr. O. E. Baker of the United States Bureau of Agricultural Economics. It is richly illustrated by many excellent maps in black and white, presenting the latest agricultural data available. This superb article will be completed in later issues, when another up-to-date colored map and the final textual material will conclude one of the best popular, thoroughly scientific presentations of North American agricultural geography in print. The next instalment in October will include important new data which have recently been tabulated and made available.

Agricultural Regions of South America, by Clarence F. Jones; *of Africa*, by Homer L. Shantz; *of Australia*, by Griffith Taylor; and *of Asia*, by Olof Jonasson, will follow in later issues.

All these articles will be illustrated by maps, charts, and pictures. The series will constitute one of the most complete geographic discussions of the world's agriculture thus far published.

To obtain the complete series of these extremely valuable articles, which present for the first time on such a comprehensive and accurate basis the significant divisions of the world's most important industry, it will be necessary to subscribe at once for ECONOMIC GEOGRAPHY, and date back to the October, 1926, issue.

In addition to this series of articles on agriculture, other series are being initiated; every issue will also contain four or five other articles dealing with urban and regional geography, with problems of land utilization, with programs of development of resources, with commerce, with transportation, with health, and with the hundred and one other subjects that are of present geographic interest, all by the most competent and best informed authorities in their respective fields. ECONOMIC GEOGRAPHY is indispensable to the intelligent citizen.

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Subscription rates are \$5.00 the year in the United States and its Territories; \$5.50 the year beyond the borders of the United States, except to charter subscribers.

Only a limited number of the first numbers of ECONOMIC GEOGRAPHY are available. Back numbers of Volume 2 for the year 1926 include the following articles:

January includes:

The Development, Strategy, and Traffic of the Illinois Central System, C. H. Markham, President, Illinois Central System.
The Agricultural Regions of Europe, Olof Jonasson, Geographic Institute of Stockholm, Sweden.
The Present Economic Conditions of Germany, Bruno F. A. Dietrich, University of Breslau.
The Cranberry Industry in Massachusetts, Carol Y. Mason, University of Illinois.
The British Fisheries, L. L. Rodwell Jones, University of London.
The Regional Geography of Anatolia, Gordon P. Merriam.
Geographic Factors in the Trinidad Coconut Industry, Preston E. James, University of Michigan.

April includes:

The Character and Distribution of South American Trade, Clarence F. Jones, Clark University.
The Water-Power Resources of Canada, M. J. Patton, Natural Resources Intelligence Service, Canada.
The Agriculture of the Eastern Shore Country, Maryland, Paul F. Gemmill, University of Pennsylvania.
Sugar Production of Czechoslovakia, Bessie C. Engle.
The Import Trade of the United States, G. B. Roorbach, Harvard University.
The Landes: Reclaimed Waste Lands of France, W. O. Blanchard, University of Illinois.
The Geographic Regions of the Sudan, George T. Renner, Columbia University.
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The Green County, Wisconsin, Foreign Cheese Industry, Glenn T. Trewartha, University of Wisconsin.

July includes:

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Argentine Trade Developments, Clarence F. Jones, Clark University.
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Oklahoma—An Example of Arrested Development, Charles N. Gould, State Geologist, Oklahoma.

October includes:

Agricultural Regions of North America, Oliver E. Baker, U. S. Dept. of Agriculture.
Caribbean Tropics in Commercial Transition, Victor M. Cutter, President, United Fruit Company.
Economic Regions of Alaska, L. A. Wolfanger, Columbia University.
The Laurentian Plateau in Canadian Economic Development, W. A. Mackintosh, Queen's University.
Evolution of Brazilian Commerce, Clarence F. Jones, Clark University.

The January issue of Volume 3, contains the following articles:

Fisheries of the North Atlantic, J. H. Matthews, Atlantic Coast Fisheries Company.
The Commercial Growth of Peru, Clarence F. Jones, Clark University.
Agricultural Regions of North America, Oliver E. Baker, U. S. Dept. of Agriculture.
A Geographic Reconnaissance of Trinidad, Preston E. James, University of Michigan.
Geographic Aspects of the Prince Edward Island Fur Industry, F. A. Stilgenbauer, University of Michigan.

April includes:

Chilean Commerce, Clarence F. Jones, Clark University.
Siberia—The Storehouse of the Future, Boris Baievsky, U. S. Bureau of Foreign and Domestic Commerce.
Utilization of the Rugged San Juans, W. W. Atwood, Clark University.
British Colonial Competition for the American Cotton Belt, Louis Bader, New York University.
Commerce and Trade Routes in Prehistoric Europe, Herdman F. Cleland, Williams College.
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